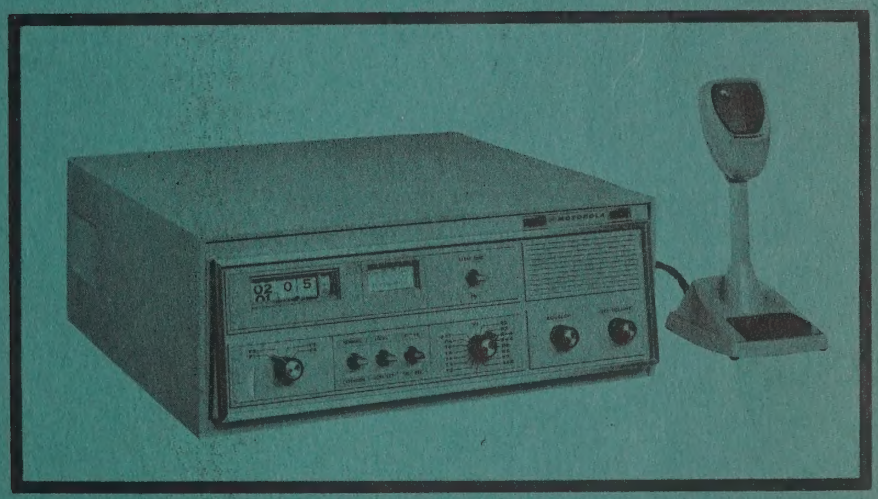
MOTOROLA

Carrier and Dual Squelch
Transistorized
Consolette Base Station
FM Two-Way Radio



406-420 MC
450-470 MC

15/30 W RF POWER

117 VAC

PRINTED IN U. S. A.

68P81051A15-A

MOTOROLA

CARRIER AND DUAL SQUELCH

TRANSISTORIZED CONSOLETTE BASE STATION

FM TWO-WAY RADIO

15 & 30 W RF POWER

406-420, 450-470 MC

117 VAC

MOTOROLA INC.
ENGINEERING PUBLICATIONS
1301 W. ALGONQUIN ROAD
Communications Division
SCHAUMBURG, ILLINOIS 60172

Printed in U.S.A.
10/1/68-RS

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Issue - A

SPECIFICATIONS

GENERAL

AC INPUT REQUIREMENTS (117 V AC)	STANDBY	.425 amperes
	TRANSMIT	3.10 amperes (30 watt models) 2.75 amperes (15 watt models)
FREQUENCY RANGE		406-420 & 450-470 mc
METERING		A single scale, 0-50 microampere meter with 20,000 ohms equivalent series resistance or Motorola portable test set can be used to measure all circuits essential to tuning and checking.
DIMENSIONS		6-1/4" high x 16-3/4" wide x 16-3/8" long overall
WEIGHT		approximately 51 lbs. (shipping weight including accessories: approximately 55 lbs.)

"L" RECEIVER

CHASSIS		TRE1110AA, AC, AE, AG	TRE1110AB, AD, AF, AH
CHANNEL SPACING		50 kc	25 kc
SELECTIVITY	-20 DB QUIETING	-100 db at ±30 kc	-100 db at ±17 kc
	-EIA SINAD	-85 db at ±50 kc	-85 db at ±25 kc
EIA SINAD INTERMODULATION		-65 db	
EIA MODULATION ACCEPTANCE		±16 kc minimum	±7 kc minimum
SENSITIVITY	-20 DB QUIETING	0.50 microvolt	
	-EIA SINAD	0.35 microvolt	
FREQUENCY STABILITY		Channel element maintains oscillator frequency within ±0.0002% of reference frequency from -30°C to +60°C ambient (+25°C reference) and ±0.00015% with a 15% primary voltage deviation.	
SPURIOUS & IMAGE REJECTION		more than 85 db	
SQUELCH		Carrier Squelch; noise compensated type, adjustable sensitivity; threshold sensitivity of 0.25 microvolt or less (Patent No. 2343115 other patents pending). "Private-Line" Tone-Coded Squelch; also includes a tone-operated squelch circuit with a fixed sensitivity of 0.25 microvolt or less (Patent No. 2688059).	
AUDIO OUTPUT		5 watts to a 3 ohm load measured at the receiver output at less than 5% distortion.	
AUDIO RESPONSE		+1, -8 db of 6 db/octave de-emphasis characteristic from 300 to 3000 cps	

"H" TRANSMITTER

CHASSIS	TTE1160AA
RF POWER OUTPUT	15 & 30 watts
OUTPUT IMPEDANCE	50 ohms
SPURIOUS & HARMONIC EMISSION	Spurious emission more than 90 db below carrier. Harmonic emission more than 80 db below carrier. (Per EIA spec, RS152A, par. 3)
FREQUENCY STABILITY	Channel element maintains oscillator frequency within ±0.0002% of reference frequency from -30°C to +60°C ambient (+25°C ref) and ±0.00015% with 15% primary voltage deviation.
MODULATION	36F3: ±15 kc for 100% at 1000 cps or 16F3: ±5 kc for 100% at 1000 cps
AUDIO SENSITIVITY	0.165 volt ±3 db for 2/3 max deviation at 1000 cps
FM NOISE	-45 db below 2/3 system deviation at 1000 cps
AUDIO RESPONSE	+1, -3 db of 6 db/octave pre-emphasis characteristic from 300 to 3000 cps
AUDIO DISTORTION	Less than 3% at 1000 cps; 2/3 system deviation

SPECIFICATIONS SUBJECT TO CHANGE WITH NOTICE

FCC LICENSE DESIGNATION:

CC4047C - 15 WATT STATIONS
CC4048C - 30 WATT STATIONS

FOREWORD

SCOPE OF INSTRUCTION MANUAL

This manual offers descriptive and service information for the radio stations described in it. Service diagrams, parts lists, and printed circuit board details are also included.

NOMENCLATURE

Motorola radio equipment is specifically identified by the model number on the nameplate.

NOTE

Be sure to use the entire model number when making inquiries about your equipment.

Identifiers have been assigned to chassis and kits. Use these identifiers when requesting information or ordering replacements.

A model chart is located in the front of this manual.

PRODUCTION CHANGES

When production and engineering changes are incorporated into the equipment, a revision numeral is assigned to the chassis or kit affected.

Typical Example:
The Model TRD1432AA becomes
TRD1432AA-1 with the first revision.

This chassis number complete with revision numeral, if any, is stamped on the chassis at the time of production. The revision numeral becomes an integral part of the chassis identifier.

A schematic diagram number complete with its issue letter is also stamped on each chassis. This establishes direct correlation between the chassis and its schematic. The schematic issue is advanced each time a change occurs in the chassis.

INSTRUCTION MANUAL REVISIONS

Changes which occur after an instruction manual is printed are described in the Instruction Manual Revision. These bulletins give the reader complete information on the change including pertinent parts listing data.

NATIONAL SERVICE ORGANIZATION

Motorola provides a nation-wide service organization. Through its maintenance and installation program Motorola makes available the finest service to those desiring reliable continuous communications on a contract basis.

The largest service organization specializing in mobile communications is Motorola's National Service Organization. Over 800 strategically located, adequately staffed and trained, independently owned and operated stations, manned with several thousand FCC licensed personnel constitute the sub-contracting force.

The administrative forces of area and district service managers and district service representatives are in the direct employ of Motorola.

For your contract service requirements, please contact your local Motorola representative or write to:

National Service Manager
Motorola Communications Division
4501 W. Augusta Blvd., Chicago, Illinois 60651

REPLACEMENT PARTS ORDERING

Motorola maintains parts and service depots and authorized service stations strategically located throughout the country. These facilities are fully equipped to give the finest service.

When ordering replacement parts, the complete number identification of the item must be used whether it be a component, kit or complete chassis. This will fix proper identification and insure receipt of the desired item. Complete number identification should also be used when requesting equipment information.

Channel element orders should specify type number, frequency, carrier frequency and the chassis model number in which the item is to be used.

Orders for "Vibrasender" and "Vibrasponder" units should specify the type number and frequency and should identify the owner and operator of the communications system in which these items are to be used.

68P81031A02-D

CAREFUL USE OF THE INSTRUCTION MANUAL AND THE MANY SUGGESTIONS CONTAINED IT WILL FURTHER INSURE PROPERLY INSTALLED AND MAINTAINED RADIO EQUIPMENT.

THE EQUIPMENT DESCRIBED IN THIS MANUAL IS MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING MOTOROLA U.S. PATENTS:

RE-24,110	2,738,466	2,925,562	3,083,332	3,200,337	3,281,697
RE-24,815	2,740,891	2,938,082	3,087,117	3,204,202	3,284,714
RE-26,079	2,743,361	2,963,577	3,087,998	3,205,455	3,298,098
2,524,534	2,759,052	2,966,585	3,087,999	3,217,270	3,292,085
2,547,023	2,759,103	2,974,221	3,091,736	3,218,587	3,293,644
2,547,025	2,777,950	2,984,740	3,094,293	3,221,120	3,295,060
2,547,027	2,799,010	2,994,844	3,101,441	3,223,953	3,300,723
2,583,032	2,808,507	3,009,115	3,119,093	3,233,243	3,304,501
2,608,648	2,809,236	3,014,127	3,126,514	3,234,469	3,304,503
2,608,649	2,830,200	3,027,454	3,128,431	3,234,484	3,305,779
2,626,384	2,833,994	3,027,455	3,129,396	3,247,475	3,306,990
2,637,782	2,883,521	3,039,081	3,131,354	3,250,997	3,307,051
2,650,333	2,834,879	3,041,550	3,149,317	3,250,999	3,307,121
2,688,059	2,888,652	3,048,659	3,162,821	3,252,109	3,322,982
2,691,094	2,899,547	3,048,747	3,175,183	3,256,497	3,333,122
2,691,560	2,901,601	3,059,184	3,175,187	3,263,172	
2,699,425	2,912,573	3,061,785	3,175,193	3,264,576	
2,705,281	2,918,571	3,070,737	3,183,382	3,273,083	
2,731,555	2,924,705	3,070,748	3,191,123	3,275,938	

Other U.S. Patents Pending

CONTENTS

SECTION PAGE

Guaranteed Performance Specifications ii
Model Chart vii

EQUIPMENT AND INSTALLATION INFORMATION

1 **DESCRIPTION**
Introduction 1-1
Basic Types of Stations. 1-1
Control Facilities. 1-2
Description of Items. 1-2
Required Accessories 1-2
Optional Accessories 1-3
Typical System Applications 1-4
Functional Description 1-6
Recommended Test Equipment 1-9

2 **INSTALLATION AND OPERATION PROCEDURES**
Inspection 2-1
Antenna and Transmission Line Considerations. 2-1
Installation of Cabinet 2-1
Initial Adjustments and Pre-Operational Checks 2-3
Operating Instructions 2-3

MAINTENANCE AND THEORY

3 **MAINTENANCE**
Description. 3-1
Recommended Checks 3-1
Chassis Access for Servicing. 3-1

4 **TRANSMITTER**
Description. 4-1
Circuit Description 4-1
Service Aids 4-2

5 **RECEIVER**
Description. 5-1
Circuit Description 5-1
Service Aids 5-5

6 **CHASSIS ASSEMBLY**
Introduction 6-1
Power Supply 6-1
"Private-Line" Tone Generator 6-3
Control Panel 6-3
Service Aids 6-5

ALIGNMENT CHARTS

20 ALIGNMENT CHARTS
Transmitter Alignment. 20-1
"IDC" Adjustment Procedure. 20-2
Receiver Alignment Procedure 20-3

SECTION PAGE

SERVICE DIAGRAMS

21 CABLING AND FUNCTIONAL DIAGRAMS
- Terminal Board Location and Pin Assignment Detail 21-1
- Intercabling Diagram 21-2
- Detailed Functional Diagram 21-3

22 OVERALL RADIO SET DIAGRAM
- Consolette Base Station Schematic Diagram 22-2/3

23 TRANSMITTER DIAGRAMS
- Exciter Circuit Board Detail and Parts List 23-1
- Channel Element (Single-Frequency Models) Circuit Board Detail and Parts List 23-3
- Channel Element (Multiple-Frequency Models) Circuit Board Detail and Parts List 23-5
- "IDC" Circuit Board Detail and Parts List 23-7

24 RECEIVER DIAGRAMS
- Receiver F3 and F4 Channel Element Circuit Board Detail and Parts List 24-1
- First Oscillator & Multiplier Circuit Board Detail and Parts List 24-3
- 8 MC IF & 2nd Oscillator Circuit Board Detail and Parts List 24-5
- 455 KC Filter Amplifier (Wideband) Circuit Board Detail and Parts List 24-7
- 455 KC IF Amplifier Circuit Board Detail and Parts List 24-9
- Audio and Squelch Circuit (Split-Channel) Board Detail and Parts List 24-11
- Audio and Squelch Circuit (Wideband) Board Detail and Parts List 24-13
- "Private-Line" Decoder and Filter Circuit Board Detail and Parts List 24-15

25 POWER SUPPLY DIAGRAMS
- Power Supply Circuit Board Detail and Parts List 25-1
- "Private-Line" Tone Generator Circuit Board Detail and Parts List 25-3

26 OPTIONAL ACCESSORIES DIAGRAMS
- VU Meter Circuit Board Detail. 26-1
- Intercom Amplifier Circuit Board Detail and Parts List 26-3
- Alert Tone Circuit Board Detail and Parts List 26-5
- DC Metering Kit Schematic Diagram and Parts List. 26-7

MOTOROLA

MODEL CHART

TRANSISTORIZED CONSOLETTE BASE STATION

406-420, 450-470 MC

15/30 WATTS RF POWER

CODE:

☒ = ONE ITEM SUPPLIED PER RADIO SET

◪ = QUANTITY SUPPLIED DEPENDENT UPON NUMBER OF OPERATING FREQUENCIES.

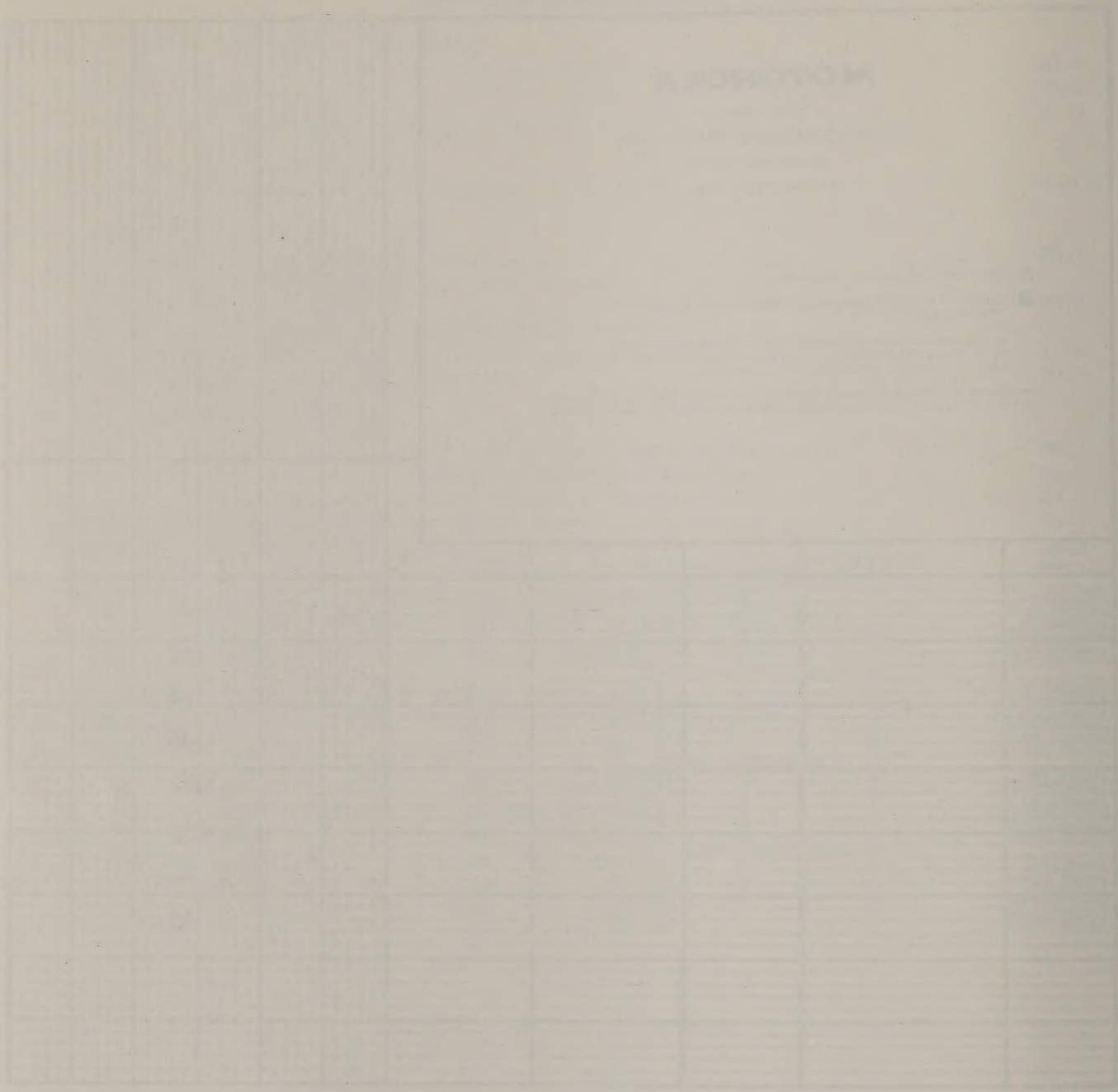
MODEL DESIGNATIONS APPEARING ON THE EQUIPMENT CHASSIS OR IN THE MODEL NUMBER COLUMN OF THIS CHART DO NOT REFLECT FACTORY-INSTALLED ACCESSORY ITEMS.

*REPRESENTS A SERIES OF MODELS AND NOT A SPECIFIC MODEL. THE SPECIFIC MODEL, AS STAMPED ON THE CHASSIS, IS DETERMINED BY ITS APPLICATION.

MODEL NUMBER	NO. OF XMTR AND RCVR. FREQS.	RF OUTPUT POWER (WATTS)	FREQ. RANGE	CHANNEL SPACING
CARRIER SQUELCH MODELS				
L34LHB-1000A	1	15	450-470 MC	50 KC
L34LHB-1090AM	4	15	406-420, 450-470 MC	50 KC
L34LHB-1100A	1	15	450-470 MC	25 KC
L34LHB-1100AM	1	15	450-470 MC	25 KC
L34LHB-1190AM	4	15	406-420, 450-470 MC	25 KC
L34LHB-1196AM	4	15	406-420, 450-470 MC	25 KC
"PRIVATE-LINE" TONE-CODED SQUELCH				
L34LHB-3000A	1	15	450-470 MC	50 KC
L34LHB-3090AM	4	15	450-470 MC	50 KC
L34LHB-3100A	1	15	450-470 MC	25 KC
L34LHB-3100AM	1	15	450-470 MC	25 KC
L34LHB-3190AM	4	15	450-470 MC	25 KC
L34LHB-3196AM	4	15	450-470 MC	25 KC
CARRIER SQUELCH MODELS				
L44LHB-1000A	1	30	450-470 MC	50 KC
L44LHB-1090AM	4	30	406-420, 450-470 MC	50 KC
L44LHB-1100A	1	30	450-470 MC	25 KC
L44LHB-1100AM	1	30	450-470 MC	25 KC
L44LHB-1190AM	4	30	406-420, 450-470 MC	25 KC
L44LHB-1196AM	4	30	406-420, 450-470 MC	25 KC
"PRIVATE-LINE" TONE-CODED SQUELCH				
L44LHB-3000A	1	30	450-470 MC	50 KC
L44LHB-3090AM	4	30	450-470 MC	50 KC
L44LHB-3100A	1	30	450-470 MC	25 KC
L44LHB-3100AM	1	30	450-470 MC	25 KC
L44LHB-3190AM	4	30	450-470 MC	25 KC
L44LHB-3196AM	4	30	450-470 MC	25 KC

ITEM	DESCRIPTION
*TTE1160AA	TRANSMITTER
*TRE1110AA	RECEIVER (CARRIER SQUELCH)
*TRE1110AB	RECEIVER (CARRIER SQUELCH)
*TRE1110AC	RECEIVER (CARRIER SQUELCH)
*TRE1110AD	RECEIVER (CARRIER SQUELCH)
*TRE1110AE	RECEIVER ("PRIVATE-LINE")
*TRE1110AF	RECEIVER ("PRIVATE-LINE")
*TRE1110AG	RECEIVER ("PRIVATE-LINE")
*TRE1110AH	RECEIVER ("PRIVATE-LINE")
TLN8676A	CHASSIS ASSEMBLY
THN6073A	CABINET
TLN8619A	MULTIPLE FREQUENCY KIT
TLN8660A	POWER SUPPLY BOARD
TLN8437A	CHANNEL ELEMENT BOARD
TLN8530A	CHANNEL ELEMENT BOARD (4-FREQUENCY)
TLN1086A	CHANNEL ELEMENT (RECEIVER)
TLN1087A	CHANNEL ELEMENT (TRANSMITTER)
TLN8622A	"PRIVATE-LINE" KIT
TLN8271A	"PRIVATE-LINE" OSCILLATOR AND DELAY BOARD
TLN6824AA	"VIBRASENDER" RESONANT REED
TLN8381A	"VIBRASPONDER" RESONANT REED
TLN6845A	TUNING TOOLS
TMN6041A	DESK STAND MICROPHONE
TMN6042A	DESK STAND MICROPHONE
TLN8661A	12 HOUR CLOCK KIT
TLN1219A	VU METER KIT
TLN1215A	INTERCOM KIT
TLN1216A	ALERT TONE KIT

EPD-18700-A



DESCRIPTION

1. INTRODUCTION

The Transistorized Consolette Base Station is a compact FM two-way radio used primarily for local control operation. The station consists of a transmitter, receiver, power supply and control panel housed in a desk top steel cabinet. The compact design of the cabinet requires minimum space for installation. A control panel on the front of the cabinet has all the necessary controls for local operation of the station. The rear of the cabinet is equipped with an antenna connector, a terminal board for external connections and a key lock. These stations operate in the 406-420 and 450-470 mc frequency range with an r-f output of 15 or 30 watts.

The Consolette stations are available in a variety of models as shown in the Model Chart at the front of this manual. They include carrier and "Private-Line" tone-coded squelch, and single or multiple frequency operation.

These stations employ completely transistorized receivers, exciters and power supplies. Only the driver and final amplifier stages in the transmitter use tubes. The advantages of the transistor--low current requirements, reliability, lightweight, compact size and low maintenance requirements--are fully utilized. Current demands are low since the use of tubes is minimized and unheated, temperature compensated, plug-in, oscillator modules (channel elements) are used for frequency control. In addition, blowers and their related maintenance problems are eliminated by the use of a heat sink on the transmitter final amplifier stages.

The station cabinet facilitates ease of maintenance and is easily removed from the chassis by loosening two thumb-screws at the rear of the cabinet. The receiver and transmitter chassis are pivoted on swivel brackets to permit tilting to a vertical position for access to either front or back sides. All external connections are made at a terminal board at the rear of the chassis and need not be disturbed for removal of the cabinet.

2. BASIC TYPES OF STATIONS

There are two basic types of Motorola Consolette base radios, carrier squelch models and "Private-Line" tone-coded squelch models. Carrier squelch base stations use (10) receivers incorporating a noise squelch circuit which eliminates disturbing background noise when no transmissions are being received.

The use of the "Private-Line" tone-coded squelch models improves radio communications especially when operating under crowded channel conditions. Several "Private-Line" networks can use the same r-f carrier frequency in the same area. Receivers will accept only the messages transmitted by units in the same net. The speaker will remain quiet during all other transmissions; personnel will not have to listen to transmissions originating outside their "Private-Line" network.

"Private-Line" transmitters are modulated by a continuous sub-audible tone in addition to the voice modulation. The receivers accept only signals which are modulated with the correct tone and reject all others unless the "Private-Line" squelch circuit is disabled. At that time, the noise operated squelch circuit is placed in operation and all on-frequency signals are heard. When the "Private-Line" squelch circuit is activated, the noise squelch circuit is out of operation.

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ENGINEERING PUBLICATIONS 1301 W. ALGONQUIN ROAD SCHAUMBURG, ILLINOIS 60172

3. CONTROL FACILITIES

Three modes of control are available with the Consolette Base Stations, they are:

a. Local Control

This is the normal mode of operation for the base station; all controls are mounted on the front panel.

b. Extended Local Control Option

In this mode of operation, a desk set is connected to the base station via a control cable which is available in lengths up to 100 feet. The base station may be controlled either at the front panel or from the desk set. (Refer to the Optional Accessories section for requirements.)

c. Remote Control Option

The remote control option necessitates the use of a remote control adapter and a remote control console. The remote control console is located at a point distant from the base station. Control of the base station is accomplished by applying various dc line currents to the remote control adapter via the control line from the remote control console. (Refer to the Optional Accessories section for requirements.)

4. DESCRIPTION OF ITEMS

a. Carrier Squelch Receivers

The completely transistorized receivers in these stations are crystal controlled dual conversion models. They provide five watts of audio power at the speaker in local control operation. RF preselectors and a sealed, life-time guaranteed "Permakay" Ⓡ filter in the i-f stages determine the excellent bandwidth and selectivity characteristics of the receivers. Temperature compensated, plug-in crystal oscillator modules (channel elements) provide excellent frequency stability without the use of crystal ovens. Disturbing noise during periods when no messages are being received is eliminated by noise actuated squelch circuitry.

b. Dual Squelch Receivers

Dual squelch receivers are used in "Private-Line" tone-coded squelch stations. The receivers are identical to carrier squelch models except that dual squelch models incorporate two types of squelch circuits (noise-operated and tone-operated). The noise-operated squelch circuit is identical to the one used in carrier squelch models. The tone-operated circuit will only unsquelch the receiver when a specific "Private-Line" tone is received.

c. Transmitter

The 406-420, 450-470 mc band transmitter provides 15 or 30 watts of r-f power, depending upon the model. Circuits include an unheated, temperature-compensated crystal oscillator module (channel element), transistorized audio amplifier and "Instantaneous Deviation Control" (IDC) circuit, varactor phase modulator, completely transistorized exciter (frequency multipliers and amplifiers), and tube-type driver and power amplifier stages. The output frequency is 36 times the crystal frequency. A high level of harmonic frequency attenuation is achieved in a harmonic filter at the transmitter output.

d. Chassis Assembly (Power Supply and Control Panel)

This chassis assembly contains the base station power supply, control panel and miscellaneous components not mounted on the receiver or transmitter chassis assemblies. The power supply provides all voltages necessary for the operation of the station. A terminal board is located at the rear of the chassis and provides a convenient means of connecting the remote control adapter, microphone or other external connections required for specific applications. The station high-voltage fuses and antenna connector are located at the rear of the unit near the terminal board; the low-voltage fuses are mounted (in clips) on the chassis top side under the receiver. An ac line cord is provided for connecting primary power to the station. The "Private-Line" tone generator is also mounted on this chassis ("Private-Line" tone-coded squelch models only), as well as some components of the optional "add-to" kits.

A basic control panel consists of a volume-on-off control, power-on and transmit indicator lights, a frequency select switch (multi-frequency models only) and a "PL" on-off switch ("Private-Line" tone-coded squelch models only). Refer to the Optional Accessories section of this manual for the various "add-to" items available for these units.

5. REQUIRED ACCESSORIES

The Motorola TMN6041A and TMN6042A Microphones are recommended for use with these

base stations. Each is a uni-directional desk-type microphone with a built-in transistorized amplifier and a push-to-talk switch. The microphones are furnished with lug-type connectors which are connected to the terminal board at the rear of the Consolette Base Station.

The TMN6042A Microphone differs from the TMN6041A in that is has a "Private-Line" disable switch which is normally used to monitor the channel prior to each transmission.

6. OPTIONAL ACCESSORIES

The following accessories are available as add-to items for the specific units noted in their description. The kits are briefly described here to indicate availability and application. When an accessory item is ordered, complete installation and operation instructions are included with the kit.

a. Metering Kits

(1) TLN8623A Meter Kit

This kit is available for local control stations and provides metering of the transmitter and receiver circuitry directly from the control panel. A 0-50 microampere meter and an eighteen-poistion rotary switch are used for metering. The meter and switch permit measurement and selection of critical test points in all receiver and transmitter circuits. The specific circuits to be measured are connected to the meter via receptacles on the receiver and transmitter chassis. The meter is mounted on the front panel and is held in place by a clip which is supplied with the meter kit. The rotary switch is mounted on the front panel frame which is in turn fastened to the front panel.

(2) TLN1219A VU Metering Kit

The VU meter kit provides a relative indication of the speech level input to the transmitter exciter. It is equipped with a variable attenuator to connect it to the exciter audio output from a microphone or remote control line. The kit consists of a VU meter and circuit board. The meter is mounted in the front panel space normally occupied by the dc meter (part of the TLN8623A Meter Kit) so that either the VU meter or the dc meter may be used, but not both. The circuit board, which includes the variable attenuator, is mounted on the chassis below the receiver.

b. Clock Kits

The Motorola TLN8625A and TLN8661A Clock Kits are available for both the local and extended local control base stations. Each is of the cyclometer type and operates on 117 volts ac.

MODEL	TYPE
TLN8661A	12-hour
TLN8625A	24-hour

c. TLN1216A Alert Tone Kit

The TLN1216A Alert Tone Kit provides a 1000-cycle tone that can be used as a signal prior to actual voice transmission or as a test tone when adjusting the deviation of a transmitter. The kit consists of a transistorized oscillator, a switch, the cabling required for circuit interconnections and the hardware for mounting to the front panel.

d. TLN8711A Single-Tone Oscillator

This kit includes an oscillator which provides a selective tone source for mobile radio units in a single-tone controlled two-way communication system. The oscillator generates a fixed frequency, short duration, or continuous audio tone when the radio transmitter is keyed. This tone modulates the carrier and is transmitted to the associated receiver stations on the same r-f channel.

The oscillator may be used to tone-alert a receiving station to a pertinent incoming call. Or, the associated receiver station may incorporate a tone decoder unit, which when activated by reception of the single-tone, will complete the audio output circuit. Thus, only the receiver for which the call was intended will receive the message. Also a tone-decoder-equipped receiver, when activated, will energize an external control circuit for repeater or alarm systems. The TLN8711A Single-Tone Oscillator provides up to five tones which may be individually selected.

e. Intercom Amplifier Kit

The Motorola TLN1215A Intercom Amplifier Kit permits intercommunication between the base station and the remote control console, between the base station and a desk set, or between two or more desk sets connected in parallel with the base station, without actuation of the transmitter. The kit consists of a transistorized amplifier, the cable for circuit interconnections, the mounting hardware, and the supervisory and intercom switch (mounted

on the front panel). The intercom also has a "squelch-priority" feature which disables the intercom any time an on-frequency carrier is received by the base station receiver.

When Motorola desk sets are used with the station, the addition of a speaker pad permits individual audio level control at the panel and desk set speakers.

f. T1370A Desk Set (Extended Local Control)

The T1370A Desk Set consists of a desk-type telephone set with a built-in speaker, a dynamic microphone cartridge containing a transistorized pre-amplifier, a rubber-covered coil cord, and an indicator light which illuminates when this or a paralleled desk set is using the transmitter. The T1370A Desk Set contains a power supply which operates from a 117 v ac source to power the indicator lamp and its circuitry. This desk set may be used with carrier squelch or with "Private-Line" tone-coded squelch models.

g. TLN1126A Remote Control Chassis ("Private-Line" Tone-Coded Squelch Stations)

The TLN1126A Remote Control Chassis permits remote control of a "Private-Line" tone-coded squelch station via a two- or four-wire audio control line. This unit contains relays, a line matching transformer on a small, compact chassis and a "Private-Line" disabling feature. The chassis is used with a Motorola T1360A series Remote Control Console, a T1375A series Remote Control Desk Set, or their equivalents.

h. TLN1127A Remote Control Chassis (Carrier Squelch Stations)

The TLN1127A (single-frequency) Remote Control Chassis permits remote control of a carrier squelch station via a two- or four-wire audio/control line. These units contain relays and a line matching transformer on a small, compact chassis. They are used with a Motorola T1360A series Remote Control Console, a T1375A series Remote Control Desk Set, or their equivalents.

i. T1251B "Quik-Call" Console

The Motorola "Quik-Call" console is a completely self-contained desk-top unit used to originate coded tone signals for use in a Motorola Selective Signalling System or equivalent.

Used with the Consolette base station, the Model T1251B "Quik-Call" console provides a fast and accurate means of selectively calling a station located within a radio network without using air time to set up the call. Using this unique system, the speaker at the reception point is silent until called via the coded tone signal on a specific carrier frequency. Each "coded" signal is transmitted during the first two to three seconds of the initial transmission to the called station. Thus, the receiver being called is changed from a standby to operating condition almost immediately. This silent standby condition relieves the operator of listening to all the interference and chatter on the channel in order to receive pertinent messages.

j. TLN8718A Junction Box Kit

This kit contains the hardware for interconnecting control facilities to the Consolette Base Station when the extended local control and/or the remote control options are used. (Refer to the Typical Systems Application Section of this manual for details.)

k. TLN8627A Wall Mounting Kit

The TLN8627A Wall Mounting Kit is available for use with all models of the Consolette base stations. When mounted on a wall, the base station is vertically oriented and is operated in the extended local or remote control mode.

l. Additional Accessories

Many other accessories are available for these stations for particular applications. See your local Motorola representative for complete details.

7. TYPICAL SYSTEM APPLICATIONS

The Consolette Base Station radio, used with its many add-to kits and accessories, features versatility. Items may be added as required to extend the function of the base station to accommodate particular requirements. This section describes just a few of the typical system applications to which the base station may be adapted.

a. System 1
(Refer to Figure 1)

This system is the basic Consolette radio installed on a desk top and using a microphone at the desk position for locally controlling the radio. The Consolette location is the operating position and the control point for the system. A "basic model" Consolette is used for this purpose.

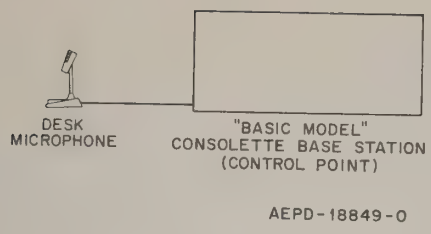


Figure 1.

b. System 2
(Refer to Figure 2)

This system provides for the operation of the Consolette in an extended-local mode, in those cases where the Consolette cannot be located on the desk top. In such a system, the Consolette is placed within 100 feet of the operating position and controlled by a Motorola desk set. The desk set is connected to the radio via a cable and becomes the control point; it also contains the necessary "transmitter-on" light. The equipment required for such a system is: (1) "basic model" Consolette less microphone, (2) desk set, (3) interconnecting cable kit and (4) wall mount brackets for the Consolette (optional).

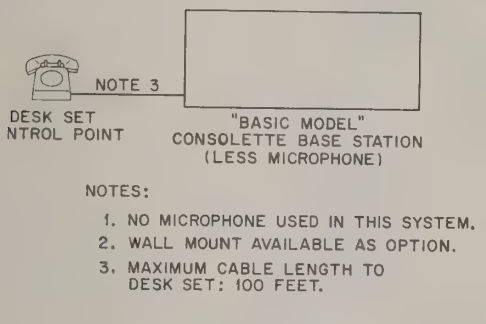


Figure 2.

c. System 3
(Refer to Figure 3)

This system has one control point with desk set extensions to other positions which may serve as dispatch points. The Consolette radio position is the control point and has complete supervision over transmissions from the desk sets. In addition, all dispatch points may communicate with one another and with the control point without activating the radio transmitter. The system incorporates a priority feature which causes any on-frequency radio message to have priority over any intercommunication taking place between the desk sets or control point. The following items are required for installing this type of a system: (1) a control point consolette, (2) a junction box kit, (3) desk sets as required, (4) desk set cabling (up to 100 feet from control point to each desk set).

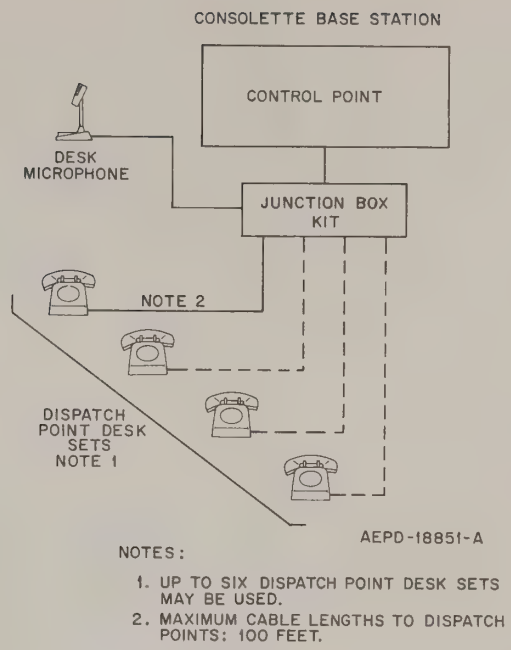


Figure 3.

d. System 4
(Refer to Figure 4)

This system provides for those who may want to license two control points for operation at a place of business during the day (primary control point) and transfer of the operation to a home during the evening (alternate

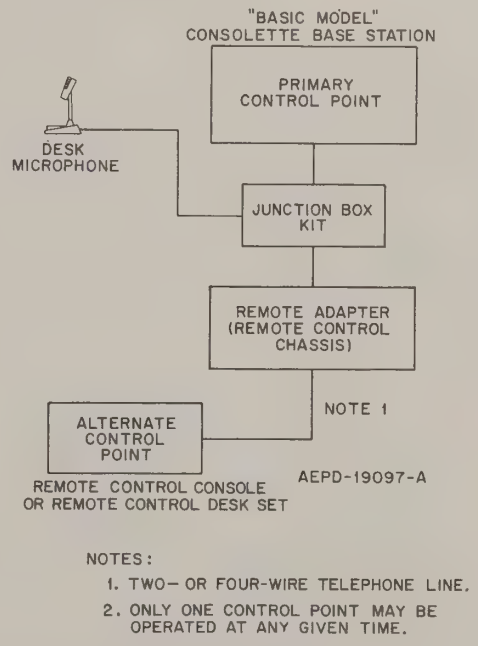
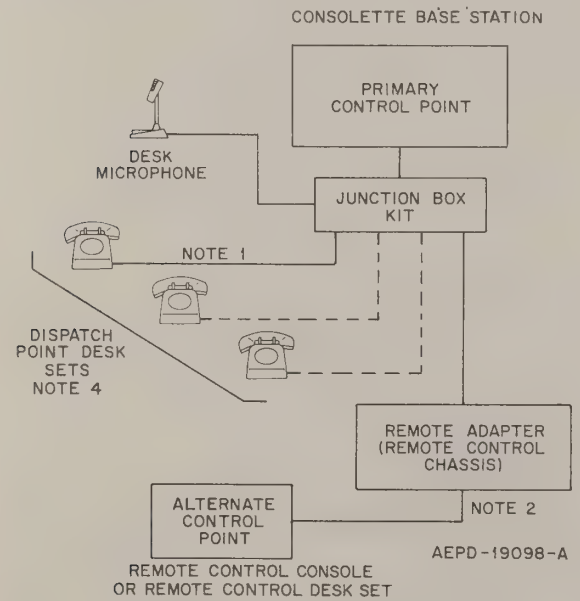


Figure 4.

control point). Operation of the radio system may be accomplished from only one or the other of the control points at a given time. A switch is provided in the junction box kit which permits transfer of the control point. This protects the location not in use from being operated by unauthorized personnel when that location is unattended. The equipment for this system consists of: (1) "basic model" Consolette with microphone, (2) a remote adapter (remote control chassis), (3) a junction box kit, (4) a remote control desk set or remote control console.

e. System 5
(Refer to Figure 5)

This system is an expansion of the system described in the preceding paragraph. It also provides dispatch points within 100 feet of the main control point. The switching provision is needed for transferring the primary control point to a night time position (alternate control point). When the control point is transferred to the alternate position, all desk sets and the microphone at the primary control point are disabled and the radio is operated from the alternate control point. This system requires the following equipment: (1) control point model Consolette, (2) a remote adapter (remote control chassis), (3) a junction box kit, (4) desk sets as required, (5) up to 100 feet of cabling for each desk set and (6) a remote control desk set or remote control console.

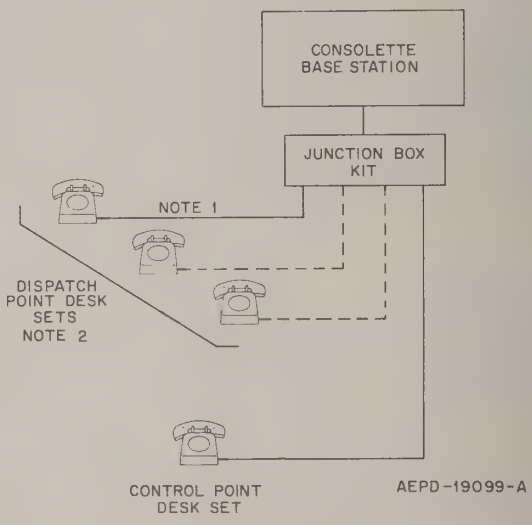


NOTES:
1. MAXIMUM CABLE LENGTH TO DESK SETS: 100 FEET.
2. TWO- OR FOUR-WIRE TELEPHONE LINE.
3. ONLY ONE CONTROL POINT MAY BE OPERATED AT ANY GIVEN TIME.
4. MAXIMUM OF SIX DISPATCH POINT DESK SETS MAY BE USED.

Figure 5.

f. System 6
(Refer to Figure 6)

This system enables a desk set to become the control point for the system with the Consolette radio located remotely or wall-mounted (option). The control point desk set includes a switch to disable all dispatch points from controlling the transmitter. Equipment required for this system is: (1) Consolette less microphone, (2) desk sets as required for dispatch points, (3) control point desk set, (4) up to 100 feet of cabling from each desk set to the Consolette location and (5) a junction box kit for desk set and/or remote capability.



NOTES:
1. MAXIMUM CABLE LENGTHS TO DESK SETS: 100 FEET.
2. MAXIMUM OF SIX DISPATCH POINT DESK SETS MAY BE USED.
3. NO MICROPHONE USED IN THIS SYSTEM.

Figure 6.

8. LOCAL CONTROL STATIONS FUNCTIONAL DESCRIPTION

(Refer to Figure 7)

a. Power Application

The primary input voltage (117 volts ac) is connected to TB4-2 and TB4-4 at the lower rear section of the base station chassis. When the on-off control (part of the OFF-VOLUME control) is turned on, the power supply is activated and the green (power on) indicator on the control panel lights. At this time, voltage is applied to the following circuits:

(1) The receiver.

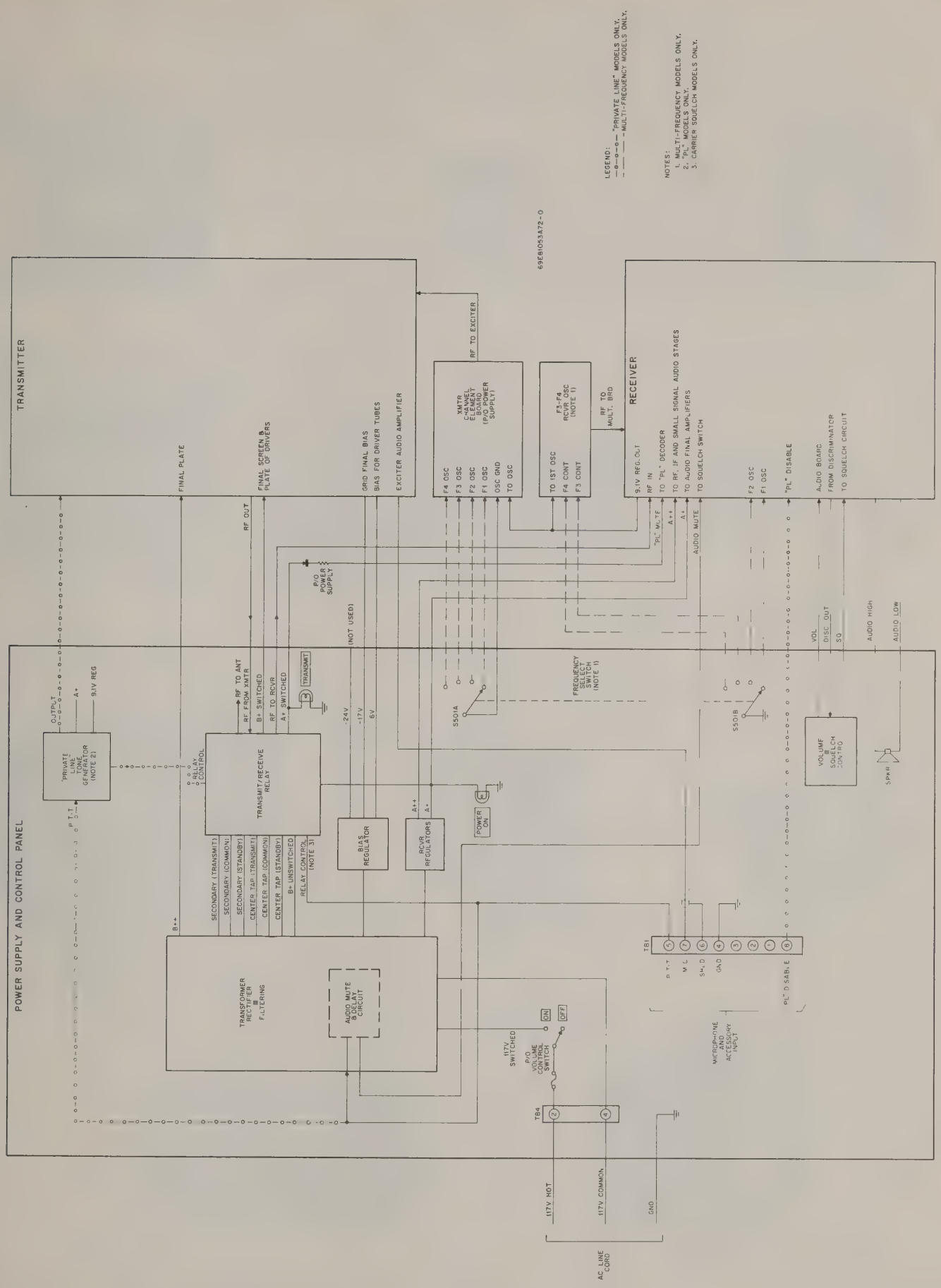


Figure 7.
Functional Diagram (Single- and Multiple-Frequency Models)

(2) The tone generator circuit in the power supply ("Private-Line" models only).

(3) The exciter stages in the transmitter.

(4) Bias and filament voltage to the driver and final power amplifier stages in the transmitter.

(5) B++ voltage to the plate of the final amplifier tube. A regulated +9.1 volts dc (derived from the receiver A++ voltage) is applied to:

(a) Receiver channel element(s).

(b) Transmitter IDC circuit and modulator bias.

(6) A+ to the transmit/receive relay coil and A+, +9.1 volts, and B+ to the transmit/receive relay contacts.

b. Frequency Selection (Multi-Frequency Models Only)

(1) The appropriate oscillator in the receiver is activated when a ground is supplied by the frequency select switch on the control panel.

(2) A ground is also supplied to the desired oscillator in the transmitter by the frequency select switch, however, the oscillator is not activated until the transmitter/receive relay is energized.

c. Transmitter-Turn-On

When the push-to-talk switch on the microphone is pressed:

(1) The receiver is muted by supplying a ground to the switch stage in the squelch circuit through the audio and mute delay circuit. (The receiver operating voltages are not removed during transmission.)

(2) The transmit/receive relay is energized and performs the following switching functions:

(a) Switches the high-voltage secondary windings from a standby set to the set which supplies the normal transmitter voltages. This action causes the B+ and the B++ voltages to be raised.

(b) Applies B+ to the plate of the driver tubes and to the driver and final amplifier screen grids.

(c) Switches the antenna from the receiver to the transmitter.

(d) Applies A+ to the red transmit indicator on the control panel causing it to light and also, through a resistor, to the receiver "PL" decoder ("PL" mute function) to prevent the receiver squelch from opening during transmission ("PL" models only).

(e) Applies +9.1 volts to the transmitter channel element(s) to activate the oscillator.

d. Transmitter Turn-Off

When the push-to-talk switch is released, the following takes place:

(1) The red transmit lamp on the control panel goes out.

(2) All circuits revert to their original state. In "Private-Line" tone-coded squelch models, the power supply (and therefore the transmitter) is held on for 150 milliseconds while a reverse phase "Private-Line" tone is transmitted. This phase shift permits the "Vibrasponder" resonant reed in the listening receiver to be damped rapidly and the receiver returned to a squelched condition. The time delay is controlled by circuitry on the "PL" tone generator.

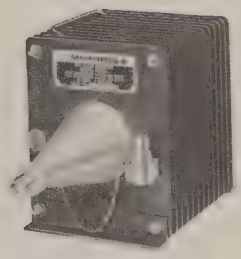
e. "Private-Line" Disable ("Private-Line" Tone-Coded Squelch Models Only)

When the "Private-Line" switch on the control panel is placed in its OFF position, a ground is removed from the dual squelch receiver permitting the noise-operated squelch circuit to operate.

RECOMMENDED TEST EQUIPMENT

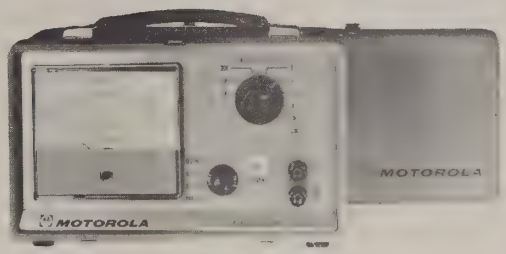
S1059A*
Portable Test Set

"Thruline"
Wattmeter



T1013A
RF Load Resistor

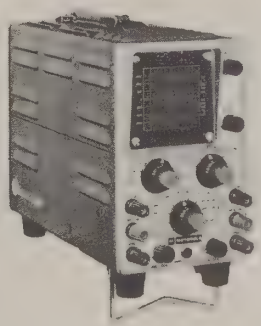
Transistorized
DC Multimeter



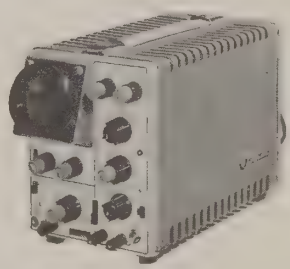
Transistorized
AC Voltmeter

TEK-1A
Transistorized Tone
Generator

T1034C
Signal Generator



T1015A
General Purpose
Oscilloscope



T1014B
Precision Wideband
Oscilloscope

T1130A Series
FM Station Monitor

S1075B
Digital Frequency Meter

*Order TKN6025A Cable Adapter also.

IMPORTANT

FCC regulations state that:

1. Radio transmitters may be tuned or adjusted only by persons holding a 1st or 2nd class commercial radiotelephone operator's license or by personnel working under their immediate supervision.

2. The r-f power output of a radio transmitter shall be no more than that required for satisfactory technical operation considering the area to be covered and local conditions.

3. Frequency, deviation and power of a base station transmitter must be checked before it is placed in service and rechecked every year thereafter.

REMEMBER

The efficiency of the equipment depends upon a good installation.

1. INSPECTION

Inspect the equipment thoroughly as soon as possible after delivery. If any part of the equipment has been damaged in transit, report the extent of damage to the transportation company immediately.

2. ANTENNA AND TRANSMISSION LINE CONSIDERATIONS

The antenna and transmission line kit are not included with the base station since each installation requires special attention. Consult your nearest Motorola representative for antenna and transmission line requirements. Installation of the antenna should be made prior to the installation of the base station. Follow the instructions included with the antenna and transmission line kits.

3. INSTALLATION OF CABINET

a. Unpacking

(1) Follow unpacking instructions printed on the inside flap of the packing carton.

(2) Remove the foam blocks from either side of the station cabinet.

(3) Remove the envelope containing the keys from the front panel.

(4) Remove the accessories from the shipping carton.

b. Location

The cabinet should be located on a solid, level surface convenient to the 117 volt ac power source and the transmission line. Allow space for ventilation at the sides of the cabinet. The transmission line should be kept as short as possible to minimize line losses.

The cabinet of the local control model base station should be located at a level where the controls on the panel are convenient to the operator.

c. AC Power

(1) Power Requirements

All stations require a 15-ampere, 120-volt, 60 cps ac power input. This circuit should be installed in accordance with local electrical codes.

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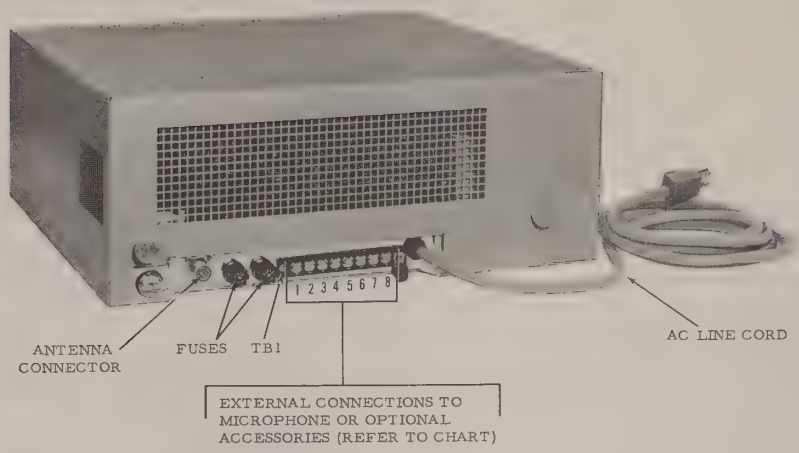
ENGINEERING PUBLICATIONS 1301 W. ALGONQUIN ROAD SCHAUMBURG, ILLINOIS 60172



CONNECT	TO TB1-
Intercom Audio Shield (Local or Remote Option Only)	1
Intercom Audio (Local or Remote Option Only)	2
Audio Hot (Local or Remote Option Only)	3
Ground	4
Push-To-Talk	5
Exciter Audio Shield	6
Exciter Audio	7
"PL" Disable	8

Figure 1.
Control Line Connection Detail

The primary ac power line may be installed prior to installation of the cabinet and terminated near the location chosen for the cabinet.

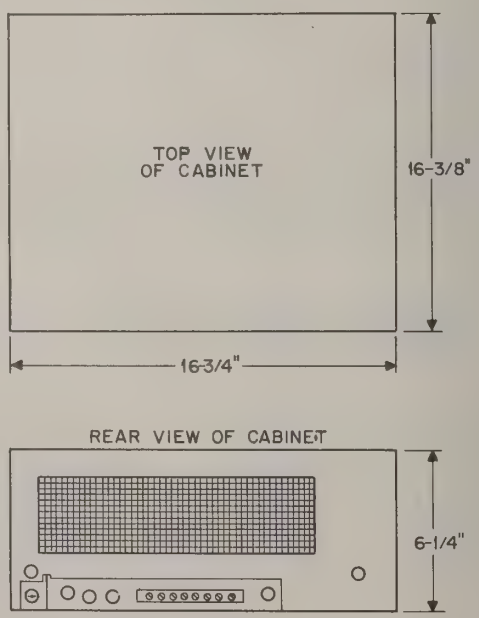
(2) Power Connection

A three-wire ac line cord is provided with the station. Connect the line cord to the ac convenience outlet.

d. Installing the TMN6041A and TMN6042A Microphones

The TMN6042A Microphone is used with carrier squelch base stations and the TMN6041A Model with "Private-Line" tone-coded squelch stations. The microphone is connected to TB1 (shown in Figure 1).

Connect the microphone as shown in the following chart (refer to Figure 1).



AEPD-18547-0

Figure 2. Cabinet Dimension Detail

MICROPHONE CONNECTIONS

WIRE COLOR	TERMINAL NO.
WHT (TMN6041A only)	8
RED	7
BLK	6
GRN	5
SHLD	4

e. Desk Sets

When using a desk set with the Consolette Base Station, remove the yellow push-on terminal from the speaker and connect it to terminal 4 of TB10. This disables the speaker (except when a speaker pad kit or intercom kit is used).

4. INITIAL ADJUSTMENTS AND PRE-OPERATIONAL CHECKS

The transmitter and receiver were accurately aligned at the factory before the station was shipped. However, the equipment should be checked before actual operation since it may have been mishandled during transit. In addition, certain adjustments such as remote control levels must be made after the installation is completed because each installation exhibits different characteristics. FCC regulations also require that transmitter frequency, power and deviation be checked before the station is placed in operation. Perform all steps of the PRE-OPERATIONAL AND ROUTINE ADJUSTMENT CHECK LIST (in the MAINTENANCE section of this manual) in sequence.

5. OPERATING INSTRUCTIONS

TO RECEIVE

MULTI-FREQ. MODELS ONLY	Place the frequency selector switch in the desired position.
ALL MODELS	Place the ON-OFF switch in the ON position or turn the OFF-VOLUME control clockwise. The green power on lamp will light to indicate the "standby" condition. The receiver is in full operation.

TO HEAR ALL ON-FREQUENCY SIGNALS

"PRIVATE-LINE" TONE-CODED SQUELCH MODELS ONLY	Place the "PL" ON-OFF switch in the PL OFF position.
ALL MODELS	Turn the SQUELCH control to the full counterclockwise position. Turn the VOLUME control clockwise until noise is heard. Adjust the SQUELCH control by turning it slowly clockwise until the noise is just squelched (cuts out). Set the VOLUME control to the desired listening level with a received signal.

TO HEAR "PRIVATE-LINE" SIGNALS ONLY

"PRIVATE-LINE" TONE-CODED SQUELCH MODELS	Place the "PL" ON-OFF switch in the PL ON position. Set the VOLUME control to the desired listening level with a received signal.

TO TRANSMIT

ALL MODELS	Proceed as previously described under "TO RECEIVE" and "TO HEAR ALL ON-FREQUENCY SIGNALS". This allows the operator to monitor the channel and prevent unnecessary interruptions of another "on-frequency" station. If the channel is clear, press the push-to-talk button on the microphone and speak clearly and distinctly into the microphone in a normal or loud voice. THE TRANSMITTER CANNOT BE OVER-MODULATED BY SPEAKING LOUDLY. The red transmit lamp will go on indicating the transmitter is on the air.

TO TURN EQUIPMENT OFF

ALL MODELS	Turn the VOLUME control counter-clockwise until a "click" is heard. The green power on indicator will go out.

1. DESCRIPTION

This section contains procedures that should be performed at the time of installation and periodically thereafter. Immediately following this paragraph is a list of recommended checks.

2. RECOMMENDED CHECKS

At the time of installation and periodically thereafter, perform all steps of the following PRE-OPERATIONAL AND ROUTINE ADJUSTMENT CHECK LIST. Keep individual records of each unit. Deterioration in performance and the need for realignment can readily be determined by comparing records of previous checks.

Additional checks as listed below may be beneficial:

a. Check primary voltage.

b. Check all accessories; such as cables, microphones, pilot lights, etc.

c. Check the antenna system.

3. CHASSIS ACCESS FOR SERVICING

The Consolette cabinet may be removed from its chassis by performing the following steps:

a. Cabinet Removal (Figure 1)

(1) Unlock the cabinet with the key provided.

(2) Unscrew the two thumb screws at the rear of the cabinet.

(3) Grasp the cabinet about midway from front to rear and slide away from the front panel until the cabinet clears the latch (approximately three inches) and lift away.

b. Tilting Receiver for Servicing (Figure 2)

(1) Loosen the hex-head bolts on either side of the receiver assembly.

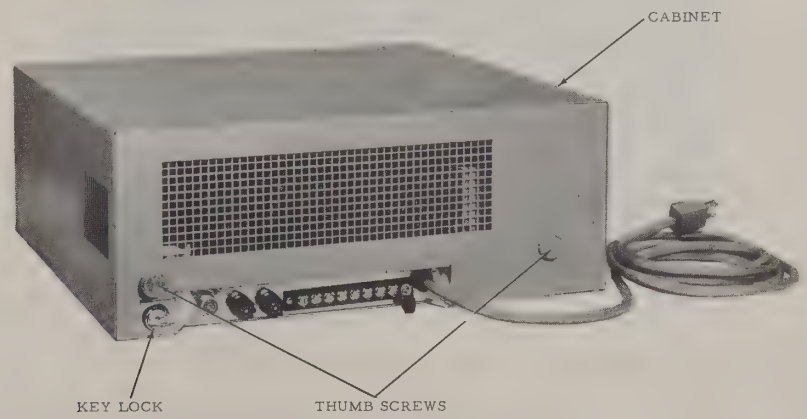


Figure 1.
Removal of Cabinet

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PRE-OPERATIONAL AND ROUTINE ADJUSTMENT CHECK LIST

UNIT	STEP	CHECK	REFER TO	LOCATION
RECEIVER	1	Compare meter readings with the minimum values in the RECEIVER ALIGNMENT PROCEDURE. Realign if necessary.	RECEIVER ALIGNMENT PROCEDURE, typical stage measurements - no signal.	ALIGNMENT CHARTS section
	2	Measure signal level required for 20 db quieting.	RECEIVER ALIGNMENT PROCEDURE, 20 db quieting.	ALIGNMENT CHARTS section
	3	Set the SQUELCH control and measure level required to open squelch threshold.	RECEIVER ALIGNMENT PROCEDURE, squelch setting and measuring squelch sensitivity.	
TRANSMITTER	4	Compare meter readings with minimum values in the TRANSMITTER ALIGNMENT PROCEDURE. Realign if necessary.	TRANSMITTER ALIGNMENT PROCEDURE, final meter readings.	
SYSTEM ADJUSTMENTS	5	Measure power output of transmitter if required.	TRANSMITTER ALIGNMENT PROCEDURE.	
	6	Measure transmitter frequency and adjust if necessary.	TRANSMITTER ALIGNMENT PROCEDURE, oscillator frequency adjustment.	
	7	Measure transmitter voice channel for proper deviation. Adjust "IDC" if necessary.	IDC ADJUSTMENT PROCEDURE.	
	8	Measure tone deviation for "Private-Line" transmitters.	IDC ADJUSTMENT PROCEDURE.	
	9	Net receiver on frequency.	RECEIVER ALIGNMENT PROCEDURE.	
	*10	Measure and adjust audio input to transmitter.	Refer to the ADJUSTMENT PROCEDURE of the APPLICABLE REMOTE CONTROL CHASSIS INSTRUCTIONS.	
	*11	Measure and adjust audio output from receivers to line.		
	*12	Measure dc control line currents.		
	*13	Check proper operation of all remotely controlled functions.		

*Remote Control Installations Only.

(2) Tilt receiver up and back until the hex-head bolts rest in the slots of the swivel brackets.

(3) Tighten hex-head bolts, if desired, to secure chassis in place during servicing.

c. Tilting Transmitter for Servicing (Figure 2)

The transmitter is tilted for service in the same manner as the receiver.

d. Dropping Front Panel for Servicing (Figure 2)

(1) Remove the bottom cover as described in paragraph e. following.

(2) Four bolts secure the front panel to the chassis, two on each side. They are located at the bottom of the triangular support at each side of the front panel. Loosen the two bolts nearest the front panel and remove the other two completely.

(3) Tilt the front panel down and away from the chassis for access to chassis and front panel components.

e. Removal of Chassis Bottom Cover (Figure 3)

Before removing the bottom cover, remove the cabinet and position the chassis with the side opposite the transformer nearest the table top.

(1) Remove the five hex-head bolts in the bottom cover.

(2) Remove cover.

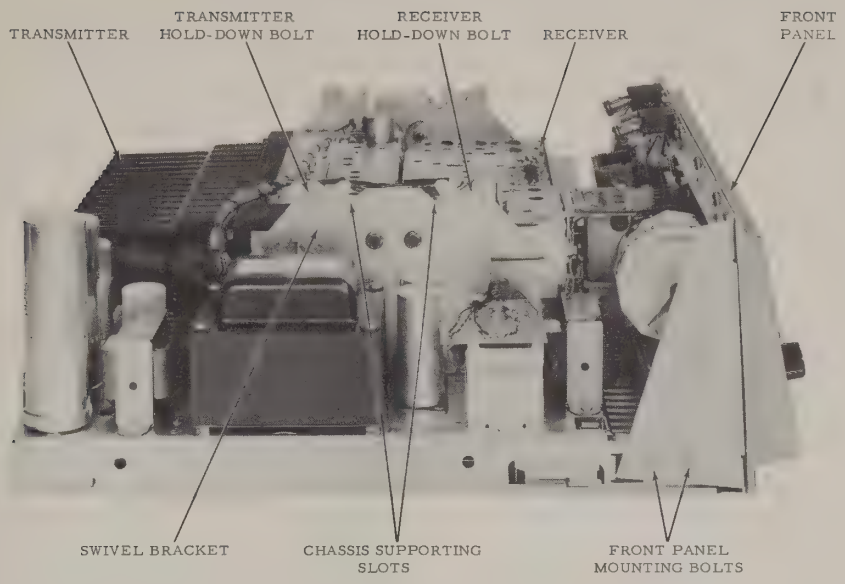

Figure 2.
Chassis Access for Servicing

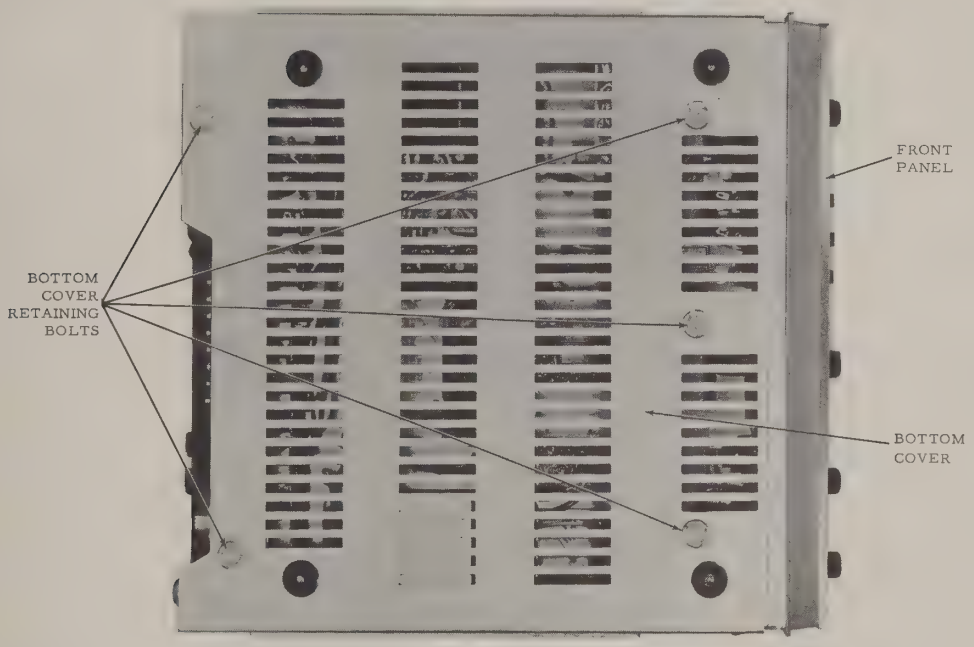

Figure 3.
Removal of Bottom Cover

1. DESCRIPTION

The transmitter consists of one (or more) crystal-controlled oscillators, a phase-modulator, several amplification and frequency multiplication stages and a final power amplifier stage. The fundamental crystal frequency is multiplied 36 times to provide the final r-f amplifier output frequency. This transmitter is available in single- or multiple-frequency, wide- or split-channel models. It operates in the 406-420 or 450-470 mc frequency range with r-f power output of 15 or 30 watts.

The Transmitter Block Diagram, Figure 1, shows the stage-by-stage signal flow and operating frequencies.

2. CIRCUIT DESCRIPTION

a. Microphone and Pre-Amplifier Circuit

The microphone cartridge and pre-amplifier act as a variable voltage generator producing an output voltage which varies with both frequency and intensity as the sound waves strike the diaphragm.

b. Deviation Limiting Circuit

In the incoming signal from the microphone, the wavefront slope depends upon both amplitude, and frequency. The overall effect of the deviation limiting circuit is to place a barrier upon the maximum wavefront slope which can pass into the modulator.

The deviation limiting circuit consists of components for pre-emphasizing (6 db/octave characteristic), amplifying and limiting, and then de-emphasizing the modulation signal. The amplifier stage clips both positive and negative peaks when they exceed the pre-determined clipping level. The audio wave passes through a low-pass filter to the "Instantaneous Deviation Control" (IDC) control. Except for slope limiting, the output waveform of the deviation limiting circuit is identical to the input waveform. The amplifier and deviation limiting circuit limits deviation by controlling the maximum

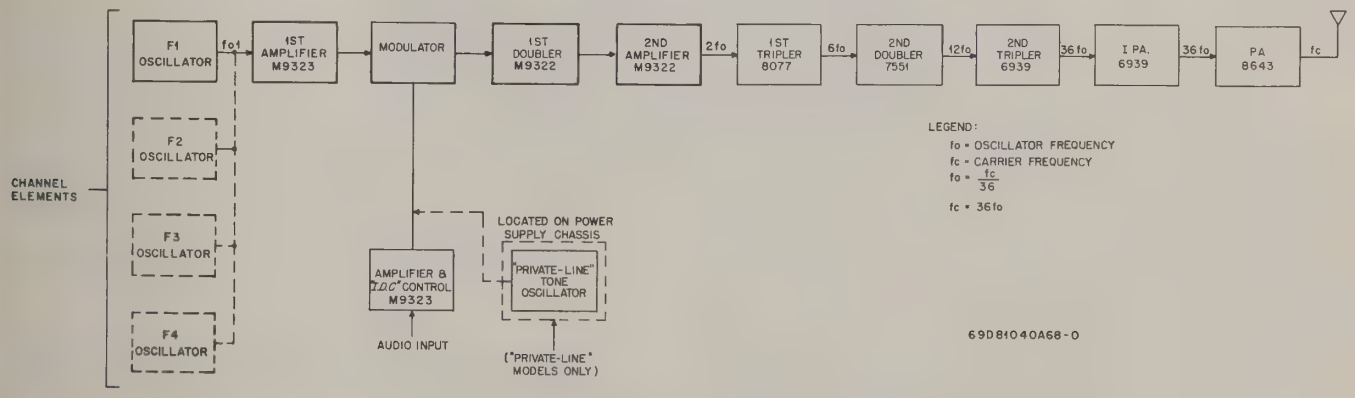

Figure 1. Transmitter Block Diagram

slope of the signal wavefront which reaches the modulator. This controls transmitter maximum deviation, since the modulator frequency shift is proportional to the slope of the audio input waveform.

c. Oscillator (Channel Element)

Since the crystals in the channel elements are unheated, each transistor oscillator circuit is individually compensated for frequency stability over the entire temperature range. The entire assembly is housed in a factory sealed, plug-in unit. For multiple-frequency radios, separate oscillator circuits are incorporated. The frequency selector completes the dc ground path for the desired oscillator. Each of the oscillators is supplied with a 9.1- or 9.6-volt regulated voltage when the transmit relay is activated.

Variable "warp" capacitors are mounted in the base of the channel element and are accessible through the circuit board. Each oscillator operates on a specific frequency in the 11.277 to 13.056 mc range.

d. Modulator

The audio output of the deviation limiting circuit is applied to the modulator which phase modulates the output of the oscillator. The tuning elements of the modulator tank circuits are varactors. The capacitance of these special back biased diodes is a function of the potential across them. The audio signal is applied to the varactors which changes this potential at an audio rate and varies the capacitance in the modulator tank circuit. This changes the phase angle of the r-f signal producing modulation.

e. Multipliers and Amplifiers

The modulator output is applied to the 1st doubler where the signals are amplifier and doubled in frequency. They are further amplified and tripled in frequency in the 1st tripler, doubled again in the 2nd doubler and tripled in the 2nd tripler. The intermediate power amplifier stage develops the required signal power to drive the power amplifier to its rated r-f power output. The signals reaching the final amplifier have been multiplied 36 times from the original frequency generated by the oscillator.

f. Transmitter Power

Power for operation of the transmitter is supplied by the power supply in the base station. The necessary voltages for the operation of the tubes and transistors is connected to the transmitter by a cable from the power supply.

3. SERVICE AIDS

Complete removal of the printed circuit boards for access to components is not always necessary.

The following steps outline procedures to prepare various parts of the transmitter for servicing. Observe standard servicing practices such as tagging of leads and identification of connecting points. Refer to the SERVICE DIAGRAMS section in this manual for lead identification and routing.

NOTE

The letters and numbers that appear in the boxes near the photographs, indicate corresponding steps in the following paragraphs. Example: b. (1) in Figure 2 indicates the location of items discussed in sub-paragraph "b. (1)".

a. 1st Tripler, 2nd Doubler, 2nd Tripler and I.P.A. Tubes (Figure 2)

Loosen four captive screws and remove rear heat sink.

b. Power Amplifier Tube (Figures 2 & 3)

(1) Loosen four captive screws and remove rear heat sink.

(2) Remove mounting screw.

(3) Lift up on plate tank circuit.

(4) Release hold down spring at left of tube (as viewed in the figure) and remove tube.

c. Access to Bottom of Exciter Board (Figure 4)

Remove four screws and slide exciter bottom cover out.

d. Access to Bottom of Power Amplifier Section (Figure 4)

Remove four screws and lift off power amplifier cover.

e. Removal of Harmonic Filter (Figures 2 & 3)

(1) Loosen four captive screws and remove rear heat sink.

(2) Remove input lead to harmonic filter from antenna at the connector. (The connector is on the chassis assembly directly beneath the transmitter.)

(3) Remove screw and spread apart chassis to allow room for removal of coaxial connector.

(4) Remove harmonic filter output lead.

(5) Remove two mounting screws and lift out harmonic filter.

f. Access to IDC Filter Board (Figure 4)

(1) Remove four screws and slide exciter bottom cover out.

(2) Remove one screw and fold out board.

g. Access to Top of Exciter Board (Figure 5)

Remove six screws and slide exciter top cover out.

h. Channel Element Board

Removal of the transmitter channel element board is described in the CHASSIS ASSEMBLY section of this manual.

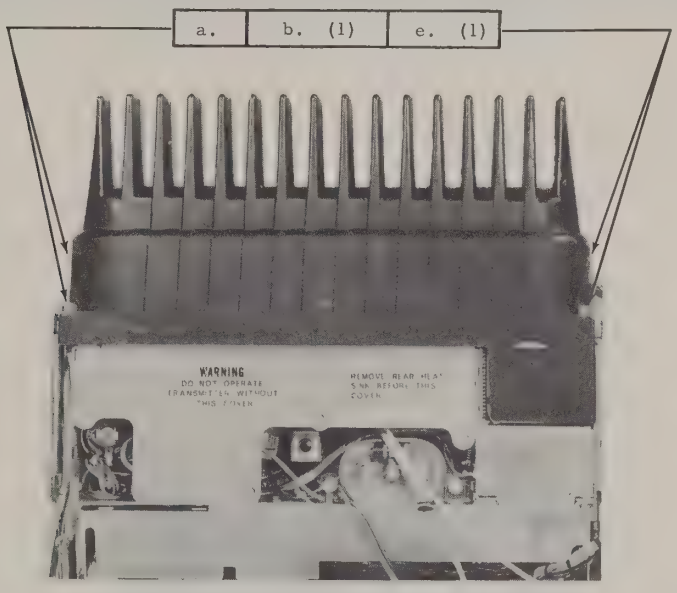

Figure 2.

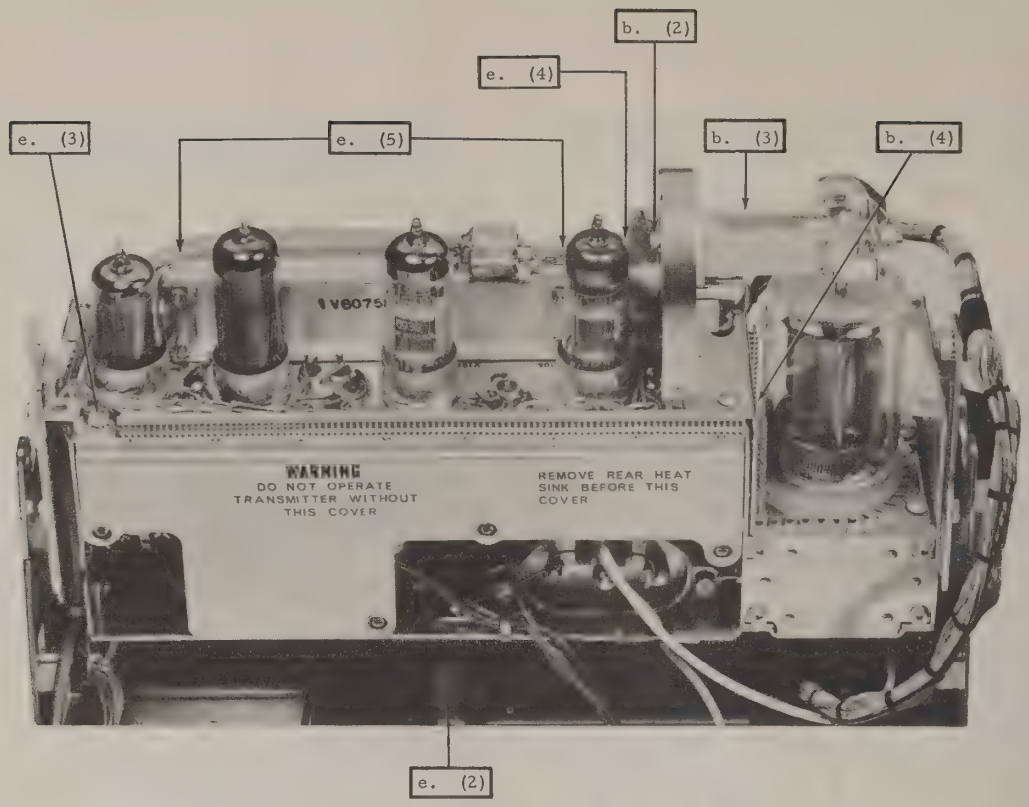

Figure 3.

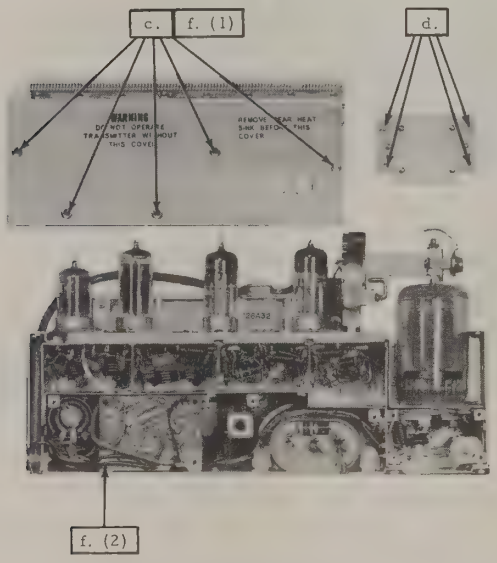

Figure 4.

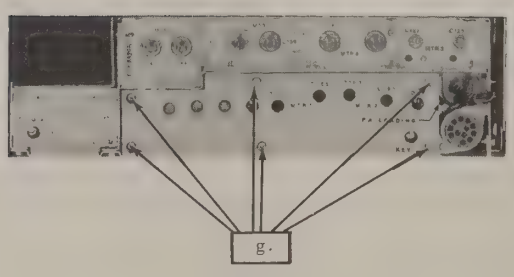

Figure 5.

MODEL TABLE

MODEL SERIES	DESCRIPTION	CHANNEL SPACING
TRE1110AA	One-Frequency Carrier Squelch	50 KC
TRE1110AB	One-Frequency Carrier Squelch	25 KC
TRE1110AC	Four-Frequency Carrier Squelch	50 KC
TRE1110AD	Four-Frequency Carrier Squelch	25 KC
TRE1110AE	One-Frequency Tone-Coded Squelch	50 KC
TRE1110AF	One-Frequency Tone-Coded Squelch	25 KC
TRE1110AG	Four-Frequency Tone-Coded Squelch	50 KC

1. DESCRIPTION

The receiver is a completely transistorized double-conversion superheterodyne type. It receives FM signals on one (or more) fixed, crystal-controlled frequencies.

Multi-frequency receivers are the same as one-frequency units, except for additional first oscillators and control circuits. Only one frequency can be received at a time. In selecting F1 on the control head, the dc ground circuit to the #1 transistor oscillator is completed, permitting the stage to operate. At the same time, the dc ground paths for the other oscillator stages are opened. As other frequencies are selected, a ground circuit is channeled to the appropriate oscillator.

The receiver block diagram, Figure 1, shows the stage-by-stage signal flow and operating frequencies.

2. CIRCUIT DESCRIPTION

a. RF Preselector and RF Amplifier

The r-f section of the receiver contains an r-f preselector and common emitter r-f amplifier stage.

The r-f preselector consists of six low loss, highly selective, helical resonant cavities. The preselector has a bandpass having a flat acceptance bandwidth and a steep skirt response to provide rapid attenuation of signals outside the acceptance bandwidth.

The carrier signals received at the antenna are coupled to the base of the r-f amplifier through the preselector cavities. The gain of this stage provides an optimum signal-to-noise ratio in the signals sent to the first mixer.

b. First Oscillator-Multiplier

The first oscillator circuitry is housed in a factory-sealed, temperature-compensated, plug-in module (channel element). The oscillator uses an unheated crystal operating on its fundamental mode in a Colpitts circuit with the output tuned to the third harmonic of the fundamental frequency. The output signal is filtered through a double-tuned circuit before it is applied to two transistor circuits which multiply it nine times. Consequently, the injection signal to the first mixer is 27 times the fundamental frequency of the crystal.

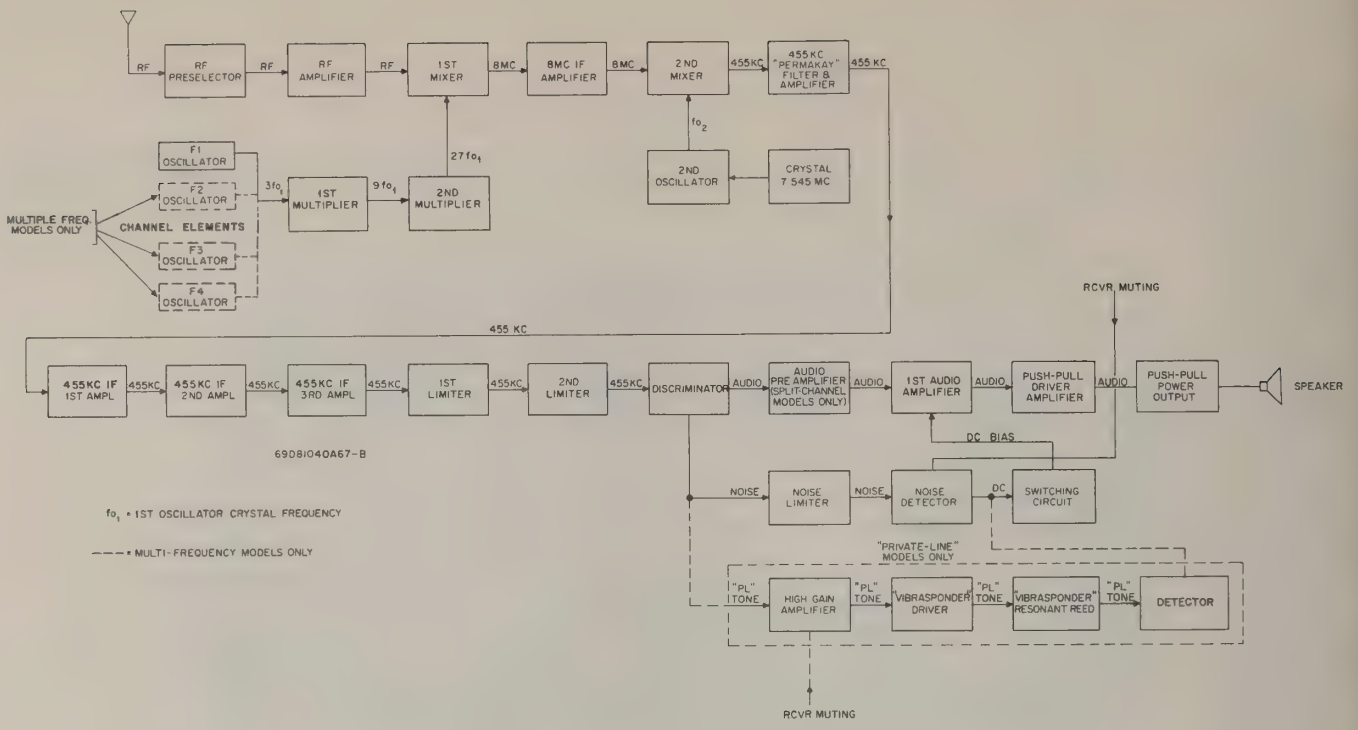

Figure 1. Receiver Block Diagram

c. First Mixer

The first mixer amplifies and heterodynes the signal from the r-f amplifier with the signals from the first oscillator to produce the first intermediate-frequency (1st i-f) of 8 mc.

These frequency relationships can be expressed as follows:

$$f_c - 27f_1 = 8 \text{ mc}$$

r-f carrier input — f_c; mult. factor — 27; channel element crystal freq. — f_1; 1st mixer output (1st i-f) — 8 mc

$$f_1 = \frac{f_c - 8 \text{ mc}}{27}$$

d. First IF, Second Oscillator and Mixer

The first i-f circuit consists of a common emitter amplifier stage and five tuned circuits. The frequency of the first i-f is 8 mc. The output of the first mixer is coupled to the base of the first i-f amplifier through a selective double-tuned circuit.

The output of the i-f amplifier is coupled to the base of the second mixer through a highly selective triple-tuned circuit. Also applied to the base of the second mixer is the injection frequency of the second oscillator. The second oscillator frequency is controlled by a 7.545 mc crystal. The frequency of the second oscillator and the first i-f is maintained constant for all incoming signals at the antenna. The difference between the second oscillator frequency and the first i-f frequency is the second mixer output. This output is a 455 kc signal. The frequency relationships of these three stages are as follows:

1st i-f	8000 kc
2nd local osc. freq.	7545 kc
Difference freq. (2nd i-f)	455 kc

e. Second IF

A "Permakay" i-f filter containing a transistor amplifier stage is used in the second i-f circuit. The filter sections are permanently sealed in polyesterstyrene and the filter is unconditionally guaranteed for the life of the receiver, provided the seal is not broken and the housing is not tampered with. The amplifier circuitry is mounted to an eyelet board within the filter and is accessible for servicing. This filter is the major factor in determining the bandwidth and selectivity of the receiver. It greatly attenuates the signal outside the pre-determined bandpass. Three i-f amplifier stages follow the 455 kc filter to saturate the limiter.

f. Limiter Stages

The two limiter stages are 455 kc amplifiers arranged so that an increase in input signal produces no change in the amplitude of the output signal. The limiters are in full saturation at all times, that is, with weak or strong signals or noise only.

When a signal is applied to the N-P-N first limiter, the base is driven negative with respect to the emitter during the negative alternation of the signal. This places a reverse bias at the emitter-base junction causing the collector current to drop to zero. During the positive half of the input signal, the base becomes more positive, increasing the emitter-to-collector current to its maximum value. Thus with a signal, the collector current is driven between cut-off and saturation. Operation of the second limiter is essentially the same except that the signal undergoes a phase reversal in the first limiter and the P-N-P transistor performs the same functions when its input signal is of opposite polarity. The output of the limiter is a signal of constant amplitude.

g. Discriminator

The discriminator used is a phase discriminator. The operation is dependent upon a 90° phase shift which occurs at resonance between the primary and secondary voltages of the tuned transformer.

The discriminator recovers the audio from the 455 kc i-f signal. A typical discriminator response curve is shown in Figure 2.

The i-f signal varies in frequency at the audio rate. This is shown below the curve. The corresponding audio output is drawn to the right of the curve.

Figure 3 is a simplified drawing of the discriminator circuit. The component reference symbol letters do not correspond to the components shown on the schematic diagram but are used to simplify the discussion.

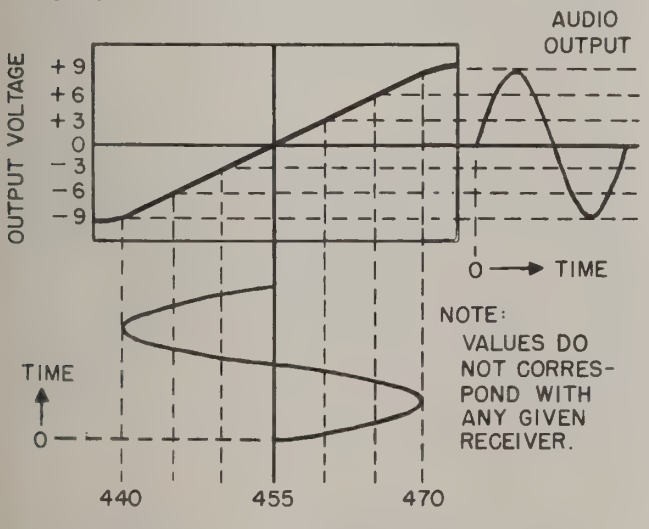

Figure 2.
Typical Discriminator Response

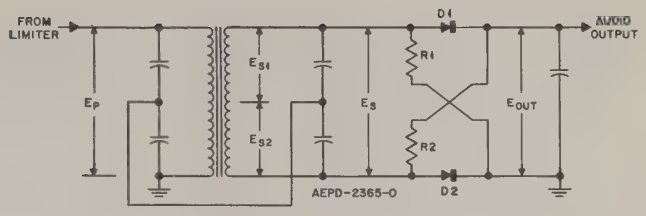

Figure 3.
Discriminator Circuit Simplified

When the frequency of the applied primary voltage (E_P) is changed, the phase angle between E_P and E_S (secondary voltage) changes from that at resonance. This changes the relative magnitude of E_{D1} (voltage at D1) and E_{D2} (voltage at D2). The phase relationships are shown in Figure 4.

The output voltages from D1 and D2 are developed across R1 and R2. The circuit is such that the output voltage (E_{OUT}) is equal to the difference between these two separate voltages. This means that when the frequency of the carrier is exactly equal to the 455 kc intermediate-frequency, no output will be obtained from the diodes. At 455 kc, the voltage drops are equal and opposite (zero balance in the receiver alignment procedure). As the signal deviates from the intermediate frequency of 455 kc, the output voltage will appear at E_{OUT}, as shown in Figure 3. The polarity of the voltage depends upon the magnitude of the voltage across R1 and R2. The discriminator output is positive below 455 kc, where the phase angle changes and E_{D1} is greater than E_{D2}, as shown in Figure 4. Above 455 kc, the phase shift makes E_{D2} greater and the output is negative.

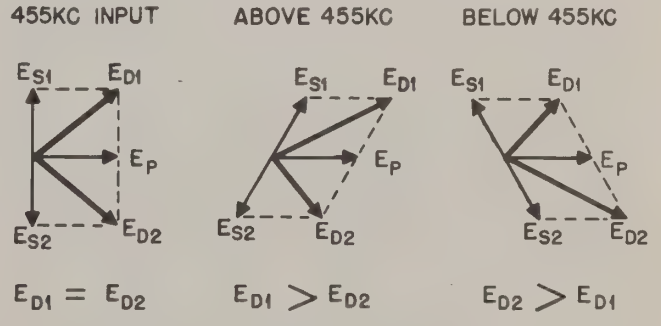

Figure 4.
Discriminator Phase Relationships

h. Noise-Actuated Squelch Circuit

The purpose of the squelch circuit is to eliminate disturbing noise which would otherwise be heard at the speaker during intervals between received messages.

The noise-actuated squelch circuit consists of a noise limiter, noise detector (rectifier) and transistorized dc control stage (switching circuit).

In the absence of a received r-f carrier (SQUELCH control at threshold), noise from the discriminator is amplified by the noise amplifier limiter. This noise voltage is rectified in the form of drawing more or less current in the noise detector stage. More current is drawn when the receiver is fully squelched (SQUELCH control fully clockwise); less current is drawn when the receiver is in the unsquelched condition.

When the noise detector is drawing heavy current, a less positive voltage is developed at the emitter element of the detector. This causes a heavy forward bias to be applied to the switching transistor which results in a heavy current through the transistor. This, in turn, reverse biases the first audio amplifier stage, cutting off the stage. Therefore, the following audio stages do not receive signals and the speaker is quiet.

When an on-frequency signal is received, the noise reaching the squelch circuit diminishes entirely, so that there is little or no output from the noise detector. As a result, the dc control stage appears as an open switch and the audio amplifier is used normally, allowing the incoming signals to reach the speaker.

i. "Private-Line" Tone-Coded Squelch Circuit

The "Private-Line" ("PL") squelch circuit consists of a low-pass filter network, a high-gain amplifier, an amplifier and clipper, a "Vibrasponder" resonant reed, an output amplifier, a detector and a driver stage.

The output from the discriminator is connected to the low-pass filter network, which passes frequencies below 300 cps. The low-frequency signals ("PL" tone) are amplified and coupled to the input of the "Vibrasponder" amplifier and clipper. The amplifier and clipper stages provide the output required for driving the resonant reed. Thus, in "Private-Line" operation the r-f carrier is always modulated by the assigned, "PL" tone, which after being detected and amplified, energizes the resonant reed. If a different tone is present with the r-f carrier, the reed will not respond due to its highly selective design. The amplifier and clipper output is applied to the resonant reed coil through a resistor and capacitor to complete the "PL" tone path. The resonant reed is permanently tuned and sealed at the factory. The reed vibrates in response to the incoming tone signal from the transmitter. The vibrating reed produces a sinusoidal output which is amplified and detected. The detected output is filtered by the driver stage to provide a dc voltage for biasing the switching transistor. The low-pass filter is paralleled by a high-pass circuit to prevent erratic action of the "Vibrasponder" resonant reed circuit caused by noise. When the proper tone signal is received and the audio amplifier is "turned on", the high-pass path is shorted to ground through a diode that is forward biased.

The squelch control is not used in "Private-Line" operation and the setting of it does not affect the "Private-Line" squelch circuit. However, in "PL" OFF operation, the squelch control does affect operation of the noise-actuated squelch circuit and should be set for squelch threshold.

In "Private-Line" tone-coded squelch models with the "PL" switch ON, the noise squelch circuit is disconnected from the discriminator output and forward bias is applied to the switching transistor. Thus only the "PL" squelch circuit is usable. When the "PL" squelch circuit output is applied to the base of the switching transistor, the transistor is biased to cut-off and appears as an open switch. Under open switch conditions, less current is drawn through the emitter resistor of the switching transistor and the first audio amplifier is biased normally, allowing the incoming signals to reach the speaker.

In "Private-Line" tone-coded squelch models with the "PL" switch in the OFF position or in carrier squelch models, the discriminator noise output is connected to the input of the noise-squelch circuit through the SQUELCH control and the fixed forward bias is removed. Under these conditions, the noise-squelch circuit output is applied to the base of the switching transistor, biasing it into conduction. Therefore, any carrier (modulated or unmodulated) will activate the noise-squelch circuit and pass the signals on to the speaker.

In "Private-Line" tone-coded squelch models, the "PL" squelch circuit is operative at all times. The "PL" switch actually switches the noise-squelch circuit in or out.

j. Audio Circuit

Audio signals from the discriminator are coupled to the first audio stage through the VOLUME control. The VOLUME control varies the signal level applied to the base of the first audio amplifier. The audio signals are amplified in the push-pull driver amplifier stage and further amplified in the push-pull power output stage. The output stage provides a 5-watt output to a 3-ohm speaker with less than 5% distortion. Response is within +1, -8 db of the 6 db per octave de-emphasis characteristic between 300 and 3000 cps.

k. +9.1 V Regulator

The 9.1 v regulator circuit essentially consists of a constant current source and a shunted Zener diode, CR7. Diodes CR9 and CR10 and resistor R91 provide a fixed voltage drop from emitter to

base of Q13, which in turn produces a constant collector current to feed diode CR7 and the load.

3. SERVICE AIDS

Complete removal of the printed circuit boards for access to components is not always necessary. For instance, the audio board may be partially disconnected and folded out.

The following steps outline procedures to prepare various parts of the receiver for servicing. Observe standard servicing practices such as tagging of leads and identification of connecting points. Refer to the SERVICE DIAGRAMS section in this manual for lead identification and routing.

NOTE

The letters and numbers that appear in the boxes near the photographs, indicate corresponding steps in the following paragraphs. Example: a. (1) in Figure 5 indicates the location of items discussed in sub-paragraph "a. (1)".

(Remove oscillator cover shield.)

a. 8 MC IF and 2nd Oscillator Board (Figure 5)

(1) Unsolder r-f output coaxial lead.

(2) Unsolder injection coaxial lead from the 1st oscillator board.

(3) Unsolder two filter leads.

(4) Unsolder three ground leads.

(5) Remove two mounting screws and fold out board.

b. 1st Oscillator Board (Figure 5)

(1) Unsolder the 1st oscillator injection coaxial lead.

(2) Unsolder ground lead.

(3) Remove two mounting screws.

(4) Remove channel elements and fold out board.

c. 455 KC Board (Figure 5)

(1) Unsolder discriminator lead (GRN-RED) and meter leads (WHT-GRN and WHT-YEL).

(2) Unsolder three filter leads.

(3) Unsolder two ground leads.

(4) Remove two mounting screws and fold out board.

d. RF Amplifier Circuitry (Figure 5)

(1) Remove ten mounting screws from r-f preselector and lift off top half.

(2) Unsolder r-f amplifier collector lead.

(3) Unsolder capacitor C1 from L6.

(4) Remove two mounting screws and lift out amplifier plate.

e. Audio Board (Figure 6)

(1) Remove three mounting screws (six screws in "PL" radios).

(2) Lift and fold out board(s).

f. "Private-Line" Decoder and Filter Board (Figure 6)

(1) Remove five mounting screws.

(2) Lift and fold out board.

g. F3 & F4 Receiver Channel Element Board (Figure 5)

(1) Remove four mounting screws.

(2) Lift and fold out board.

h. "Vibrasponder" Resonant Reed (Figure 6)

To remove the "Vibrasponder" resonant reed, grasp firmly and pull out.

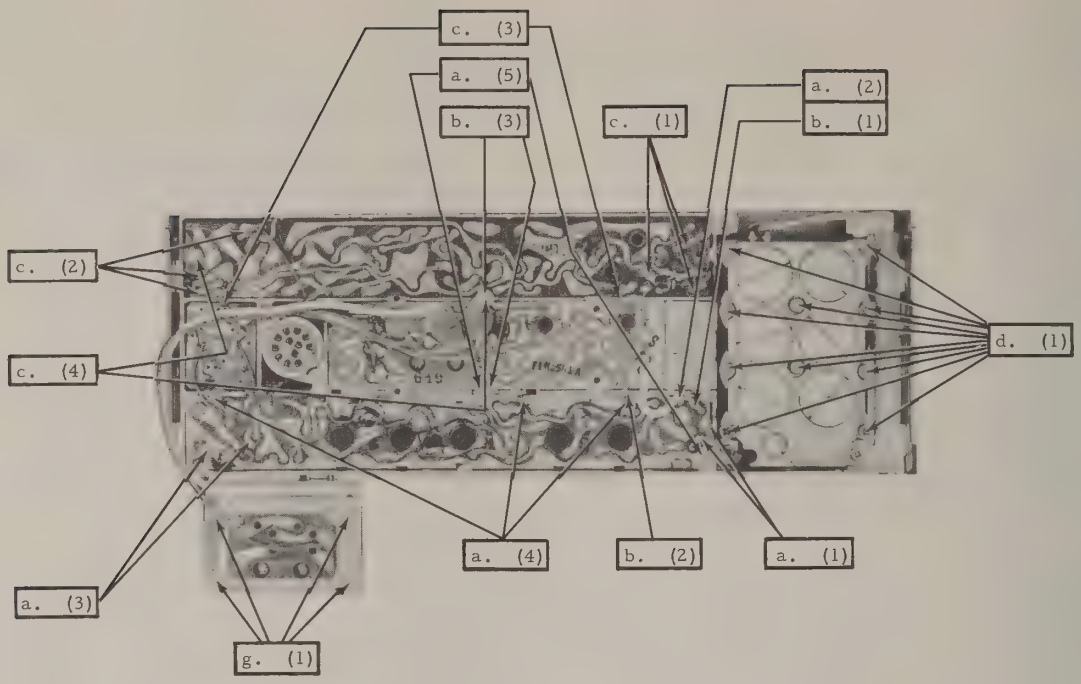

Figure 5.

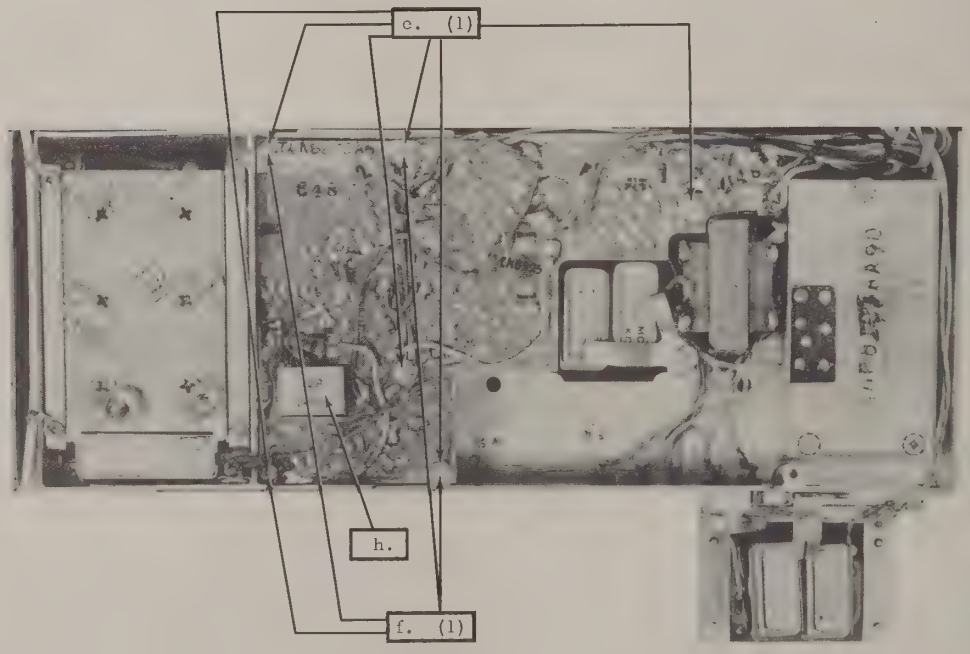

Figure 6.

CHASSIS ASSEMBLY

MODEL TLN8676A

1. INTRODUCTION

The Consolette base station chassis is the basic framework for mounting of the power supply, the "PL" tone generator, the transmitter channel element board and the control panel. This chassis assembly provides the swivel brackets for mounting the receiver and transmitter as well as mounting provisions for miscellaneous power supply components, control panel components and terminal boards for intercabling purposes. This section of the manual describes the power supply, "PL" tone generator and the control panel. (Operation of the transmitter channel element circuitry is described in the TRANSMITTER section of this manual; see Figure 2 for location of the channel element board.)

2. POWER SUPPLY

a. Description

The power supply provides all voltages required for the operation of the base station. In addition, it contains the majority of the base station intercabling.

The power supply is completely solid-state and provides extreme reliability and stability. It provides B+, B++, -24.5, +13.8 (A++) and +13.2 (A+) volts dc for operation of the transmitter, receiver, control circuitry, and accessories. The power supply also provides 12.6 volts ac for the transmitter filaments.

b. Circuit Theory

(Refer to Schematic Diagram 63P81053A64)

(1) General

Power transformer T201 is the source for all voltages developed in the power supply. Secondary winding A is the source for the transmitter B+ and B++ voltages, respectively. The B+ and B++ outputs differ in the high- and low-power models (30- and 15-watt models, respectively) and are derived from different secondary winding A taps. These tap connections are made at the factory and are shown in the following table.

Application	B+ Voltage		B++ Voltage	Power Amplifier Filter Input Power
	Tap On Secondary A	Output Voltage	Output Voltage	
L44LHB Series Stations	5, 8 and 9 (Standby)	255	510	60 W
	4, 7 and 9 (Transmit)	260	400	
L54LHB Series Stations	5, 8 and 9 (Standby)	255	510	120 W
	3, 6 and 9 (Transmit)	260	630	

(2) Low Voltage Power

When 117 v ac is applied to the primary of T201, the voltage from secondary winding C is applied to two independent full-wave rectifiers combined in a bridge configuration. One rectifier, consisting of CR209 and CR211, supplies -35 vdc to series regulator Q201 after being filtered by capacitor C208. Zener diode CR213 establishes a reference voltage at the base of Q201, the -24 volt regulator. An increase or decrease in line voltage causes a corresponding increase or decrease in the voltage drop across the collector-emitter junction of transistor Q201. This action maintains the output voltage at a constant level. The regulated output voltage is taken at the emitter of Q201 and

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applied to a divider network consisting of R220, R221 and R222. Three negative voltages are supplied in this power supply, however, only the -17 and -6 v dc outputs are used. The -24 v dc output is not used in this application.

The second rectifier, consisting of CR210 and CR212 supplies +35 v dc which is filtered by C209A and applied to series regulators Q202, Q203 and Q204. Transistor Q205 provides regulation of both A++ and A+ output voltages as follows:

If the line voltage increases, the dc output voltage of the power supply increases. The increase in output voltage increases the bias voltage on Q205 which causes the current through the transistor to increase. The increase in conduction of Q205 decreases the bias to Q204 which decreases its emitter current and subsequently the base current of Q203. Less base current in Q203 causes an increase in the collector-to-emitter voltage across Q203 and Q202 which decreases the output voltages proportionately. A decrease in line voltage will have the opposite effect. Diode CR214 provides compensation for any change in the base-to-emitter voltage of transistor Q205 with temperature.

(3) Filament Voltages

Filament voltage of 12.6 v ac is supplied to the transmitter from winding B of T201. One side of the winding is grounded on the transmitter chassis.

(4) High Voltage Supply

When 117 v ac is applied to T201, the output of secondary winding A is applied to the bridge rectifier consisting of CR201, CR202, CR203, CR204, CR205, CR206, CR207 and CR208. The output voltage depends on the taps selected as shown on the application table in preceding paragraph (1). Tap selection is accomplished when the transmit/receive relay is energized. This action raises the B+ and B++ voltages to their normal values for transmitter operation. B++ is taken at the output of the bridge rectifier and applied to the top stack (L201, C201 and C204) of the pi filter. B+ is taken at the center tap of T201 through relay K201 and applied to the bottom stack of the pi filter (L202, C202A, C202B and C203). The B++ is applied to the power amplifier plate and the B+ is applied to the power amplifier tube screen and driver plates.

c. Troubleshooting

Use standard troubleshooting techniques to isolate a power supply malfunction to a particular stage. When an inoperative stage has been located, compare the voltage readings to those shown on the power supply schematic diagram and in the troubleshooting chart to determine the faulty component. Refer to Figures 1, 2 and 3 for component location.

The Motorola Transistorized DC Multimeter and the Motorola T1014B Precision Oscilloscope are recommended for troubleshooting this equipment.

TROUBLESHOOTING CHART

SYMPTOM	PROCEDURE
No output from power supply	Check F201
No B++	1. Check F202 (15 W models only) 2. Check F201 3. Check CR201 and CR208 4. If B++ is low, check dc resistance of L201
No B+	1. Check F202 (Except 15 W models) 2. Check CR201 and CR208 3. If B+ is low, check dc resistance of L202
No -17 or -6 v outputs	1. Check Q201 emitter, base and collector voltages 2. Check F203 3. Check CR209 and CR211
-24 v line is less than -22 v or greater than -27 v	1. Check collector-to-emitter voltage of Q201 2. Check CR209 and CR211 3. Check CR213 anode and cathode voltage
A+ or A++ low or high	1. Readjust R231 2. Check Q205 collector voltage 3. Check Q202, Q203 and Q204 voltages 4. Check for external short circuit
No 13.8 v output (A++)	1. Check F204 2. Check CR210 and CR212 3. Check Q203, Q204 and Q205 voltages 4. Check for external short circuit
No 13.2 v output (A+)	1. Check F204 2. Check voltages on Q202 emitter, base and collector 3. Check A++ 13.8 v output 4. Check for external short circuit

3. "PRIVATE-LINE" TONE GENERATOR

a. Description

The "PL" tone generator consists of a transistorized two-stage oscillator and "reverse-burst" switching circuitry. The frequency determining element of the oscillator is a Motorola "Vibrasender" resonant reed (an electro-mechanical equivalent of a parallel-tuned high-Q tank circuit). The oscillator operates continuously when the radio set is turned on. It is located on the bottom side of the chassis as shown in Figure 3.

b. Circuit Theory
(Refer to Schematic Diagram 63P81053A64)

The oscillator circuit is made up of Q704, Q705, the "Vibrasender" resonant reed and the bias circuitry. The tone output is taken from the collector of Q705 or from resistor R724 in the emitter circuit of Q705. The selection of these two paths is determined by diodes CR710 and CR711. When the transmitter is keyed, the push-to-talk lead is connected to ground. The diode bridge (comprised of CR701, CR702, CR703 and CR704) causes Q701 to turn on. When this happens, CR710 becomes reverse biased and CR709 is forward biased through R728, R730 and R731. The tone oscillator output is now taken from R724. When the push-to-talk button is released, Q701 is turned off and CR710 is now forward biased through R725, and R729. Diode CR709 becomes reverse biased and the tone output is now taken from the collector of Q705. The 180° phase shift between the two tone paths gives a "reverse-burst" of tone just after the push-to-talk button is released. This tone prevents "squelch tail" from occurring in the receiver by quickly damping the "Vibrasponder" resonant reed. Even though the push-to-talk button is released, the transmitter remains "on" for approximately 150 milliseconds so that the "reverse-burst" of tone may be transmitted. This delay is accomplished by Q702 and Q703 which comprise the "reverse-burst" switching circuitry. When the transmitter is keyed, Q701 and Q703 are immediately turned on. Q703 supplies current to the transmit-receive relay which turns on the power supply. When the push-to-talk button is released, Q701 and Q702 are turned off but Q702 turns on again after capacitor C701 is discahrged through R704 and R705. It should be noted that during the discharge time (approximately 150 milliseconds) Q702 is off and Q703 is on. Finally, as Q702 is turned on, Q703 is turned off. This action removes the voltage from the relay which turns off the power supply and the transmitter.

4. CONTROL PANEL

a. Description

The control panel provides all controls required for operation of local and extended local control base stations.

A basic panel consists of the following controls:

Volume Control/On-Off Switch
Squelch Control
Power On-Off Indicator
Transmit Indicator
Frequency Select Switch (Multiple-Frequency Models Only)
"Private-Line" Disable Switch ("Private-Line" Models Only)

A number of optional "add-to" items are available for these control units. Refer to the DESCRIPTION section of this manual for a listing of these items.

b. Circuit Theory
(Refer to Schematic Diagram 63P81053A64)

(1) Power On-Off

When switch S503 (part of the volume control) is turned on, 117 volts ac is applied to the power supply. At the same time, the power on indicator lights.

The receiver is placed in operation immediately upon application of primary voltage to the power supply. The transmitter remains off until the microphone push-to-talk switch is pressed.

(2) Volume and Squelch Controls

These controls perform the functions standard to communications receivers, that is, controlling receiver volume and noise level.

(3) Push-To-Talk Operation

When the P-T-T switch on the microphone is pressed, a ground is applied to the transmit/receive relay K201. This action causes K201 to energize to the transmit condition.

(4) Transmitter Turn-Off

When the microphone P-T-T switch is released, the ground is removed from transmit/receive relay K201, the relay de-energizes and all

BASIC JUMPER CONNECTIONS FOR FOUR-FREQUENCY RADIO SETS

NO. OF FREQS.		JUMPERS				JUMPERS				RCVR CHAN ELEMENT LOCATION				XMTR CHAN ELEMENT LOCATION			
XMIT	RCV	R1	R2	R3	R4	T1	T2	T3	T4	1	2	3	4	1	2	3	4
1	4	○	○	○	○	●	●	●	●	X	X	X	X	X			
2	4	○	○	○	○	○	●	●	●	X	X	X	X	X	X		
3	4	○	○	○	○	○	○	●	●	X	X	X	X	X	X	X	
4	4	○	○	○	○	○	○	○	○	X	X	X	X	X	X	X	X
1	3	○	○	●	●	●	●	●	●	X	X	X		X			
2	3	○	○	●	●	○	●	●	●	X	X	X		X	X		
3	3	○	○	●	●	○	○	●	●	X	X	X		X	X	X	
4	3	○	○	●	●	○	○	○	○	X	X	X		X	X	X	X
1	2	○	●	●	●	●	●	●	●	X	X			X			
2	2	○	●	●	●	○	●	●	●	X	X			X	X		
3	2	○	●	●	●	○	○	●	●	X	X			X	X	X	
4	2	○	●	●	●	○	○	○	○	X	X			X	X	X	X
1	1	●	●	●	●	●	●	●	●	X				X			
2	1	●	●	●	●	○	●	●	●	X				X	X		
3	1	●	●	●	●	○	○	●	●	X				X	X	X	
4	1	●	●	●	●	○	○	○	○	X				X	X	X	X

NOTES:

1. R1, R2, R3, R4, T1, T2, T3 AND T4 ARE THE LOCATIONS OF JUMPER POINTS. DASHED LINES ON THE DIAGRAM INDICATE THEIR RECOMMENDED JUMPER PATHS, WHEN LESS THAN FOUR FREQUENCIES ARE USED.
2. WHEN ADDING CHANNEL ELEMENTS, JUMPERS MUST BE REMOVED. REMOVE JUMPERS FROM FREQUENCY SELECTOR SWITCH AT THE JUMPER POINTS SHOWN IN THE TABLE WHEN CHANGING TYPE OF OPERATION.

EPD-19521-O

circuits revert to their standby condition (on "Private-Line" models, the transmit/receive relay is controlled by transistor Q703 of the "Private-Line" tone generator).

(5) "Private-Line" Disable Switch

This switch is provided to disable the receiver "Private-Line" squelch circuit. In the "PL" OFF position, all on-frequency signals will be heard. When placed in the "PL" ON position, only signals coded with the proper tone will be heard.

Transistor Q501 is normally conducting with forward bias provided by a positive voltage applied through R501 and R502. When the manual switch is placed in the "PL" OFF position, a ground is applied to the base of Q501, cutting it off. Its collector becomes an open circuit which de-activates the "Private-Line" squelch circuit and allows all on-frequency signals to be heard.

(6) Non-Standard Frequency Selection (Multiple-Frequency Models)

NOTE

FCC approval must be obtained before adding or changing frequencies.

Radio sets having less than four transmitting and/or receiving frequencies are possible by using less than the full complement of channel elements. For example, a radio set may have two transmitting frequencies and four receiving frequencies (C2-R4) operation). On such radio sets, jumpers are added at appropriate points on the FREQUENCY SELECTOR switch to permit alternate frequency operation on the positions without channel elements. For example, a C2-R4 radio set can be jumpered so that one of the two available transmitting frequencies can be transmitted in each position of the F1-F2-F3-F4 frequency selector switch. The basic jumper connections for each type of operation are listed in the accompanying

table. However, a large number of variations are possible for each type of operation by changing the positions of the channel elements and changing the jumper connections. As an example, the basic jumper connections for C1-R4 operation provide transmission of the C1 frequency in all four positions of the frequency selector switch. If another form of C1-R4 operation is desired, such as transmit and receive on the F2 and F4 positions and receive only on the F1 and F3 positions, the basic jumper connections cannot be used. Proper jumper connections and location of channel elements for this and all types of operation can be calculated from the following procedures and typical examples.

To receive the same frequency on more than one position of the frequency selector switch, jumper the corresponding switch terminals together.

EXAMPLE 1

Condition Desired:

452.750 mc on F1 and F4 positions
452.800 mc on F2 position
452.850 mc on F3 position

Procedure:

Jumper point R1 (refer to the switch detail S501A & S501B shown on the power supply schematic diagram part of the overall base station schematic diagram) to point R4 on the switch. Plug the 452.750 mc channel element into the receiver F1 position. No channel element is used in the receiver F4 position. Plug the 452.800 and 452.850 channel elements in the F2 and F3 positions respectively.

EXAMPLE 2

Consition Desired:

452.750 mc on F1 and F3
452.850 mc on F2 and F4

Procedure:

Jumper point R1 to R3 and plug the 452.750 mc channel element into the receiver F1 position and none into the F3 position. Jumper point R2 to R4 and plug the 452.850 mc channel element into the receiver F2 position and none into the F4 position.

To transmit the same frequency on more than one position of the frequency selector switch, jumper the corresponding switch terminals together.

EXAMPLE 3

Condition Desired:

452.750 mc on F1
452.800 mc on F2 and F4
452.850 mc on F3

Procedure:

Jumper point T2 to T4 on the switch. Plug the 452.800 mc channel element into the transmitter F2 position. No channel element is used in the transmitter F4 position. The transmitter F1 and F3 channel elements are installed in the normal manner.

5. SERVICE AIDS

a. General

Complete removal of the printed circuit boards for access to the components is not always necessary. In most cases, the board can be folded away from the chassis to expose the components.

The following figures and paragraphs give procedures for removing the circuit boards and transistors. If it is necessary to disconnect leads from the circuit board, observe standard servicing procedures such as tagging leads and identifying connecting points.

NOTE

The letters and numbers that appear in the boxes near the photographs indicate corresponding steps in the following paragraphs. Example: [5. d.] in Figure 2 indicates the location of items discussed in sub-paragraph "5. d.".

b. Power Supply Circuit Board

For access to the components on this board, remove the four mounting screws shown in Figure 3. Fold the board out of the radio set chassis.

c. "Private-Line" Tone Generator Board

Remove the five mounting screws shown in Figure 3 and lift the circuit board out of the radio set chassis.

d. Transistor Removal

The transistors mounted on the chassis are removed by removing the two mounting screws on the transistor. When removing transistors Q202

and Q203 pull the transistors out of their sockets. When removing transistor Q201, unsolder its leads from terminal board TB9. Refer to Figure 2 for transistor location and to Terminal Board Location and Pin Assignment Detail EPD-18625 in the cabling and functional diagrams section of this manual for location of terminal boards.

e. Transmitter Channel Element and Board Removal

(1) Remove the channel element board by unscrewing the four screws and lifting the board away from the chassis. See Figure 4 for details.

(2) To remove the transmitter channel elements only, loosen the quarter-turn retaining stud securing the mounting bracket and lift out the entire assembly. Pull out the desired channel element. See Figure 4 for the location of the retaining stud.

f. Fuses

(1) Fuses F201 and F202 are accessible from the rear of the base station chassis. See the control line connection diagram in the INSTALLATION & OPERATION section of the manual for fuse location.

(2) Fuses F203 and F204 are installed in clips on the radio set chassis. Loosen two screws securing the receiver to the swivel bracket and rotate the receiver away for fuse accessibility. See Figure 2 for fuse locations.

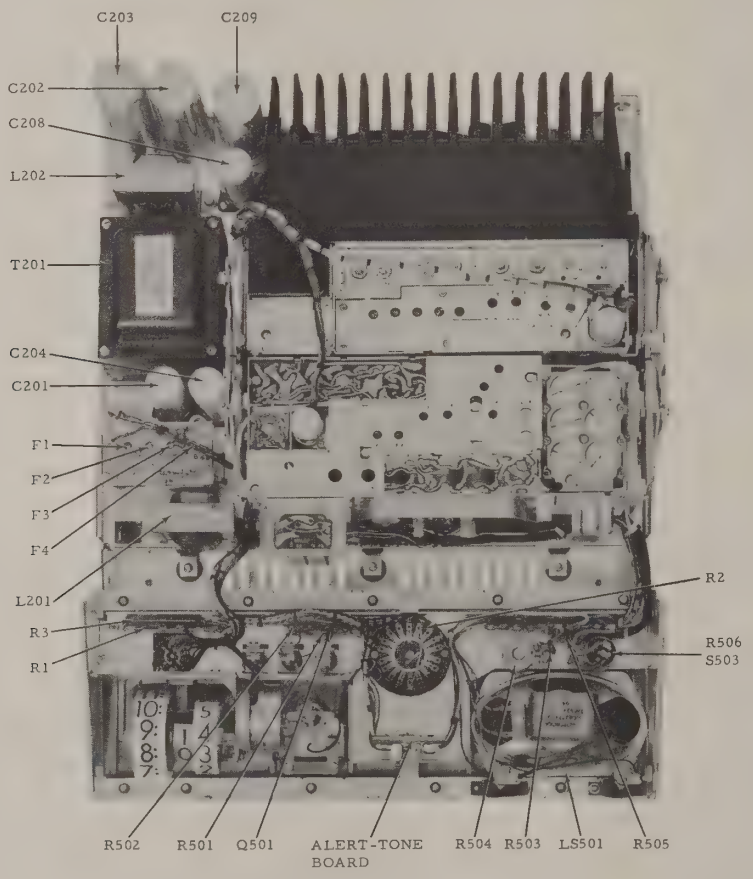


Figure 1.
Miscellaneous Components
Location Detail
(Top View of Chassis with Front Panel
Folded Out)

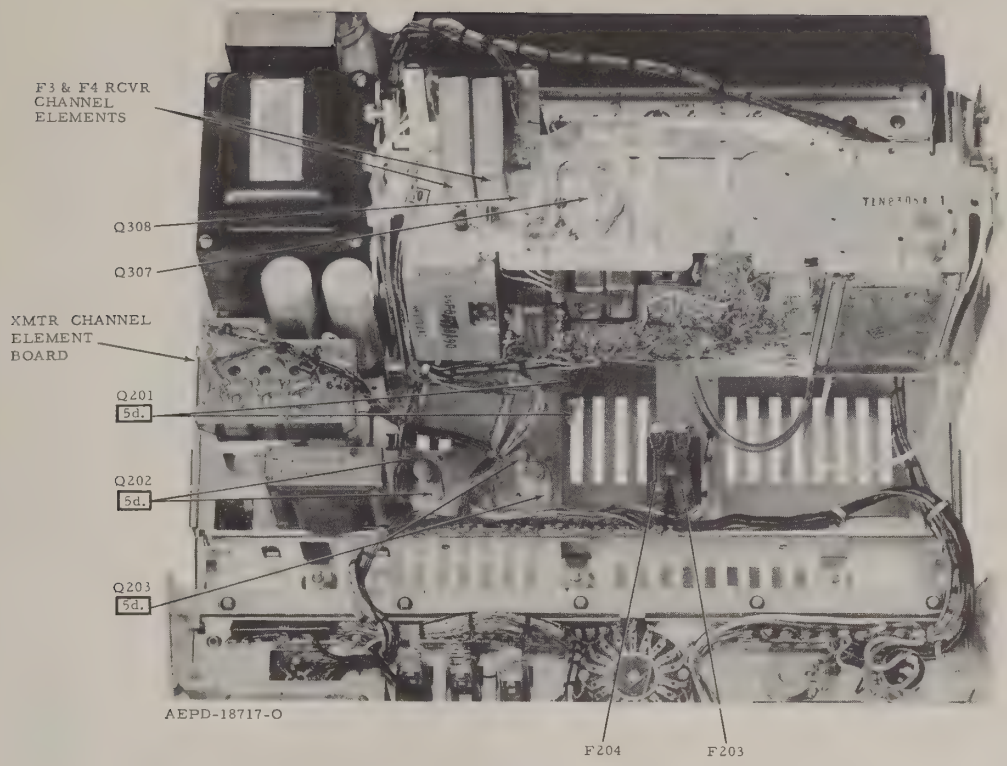


Figure 2.
Miscellaneous Components Location Detail
(Top View of Chassis with Receiver Tilted Up)

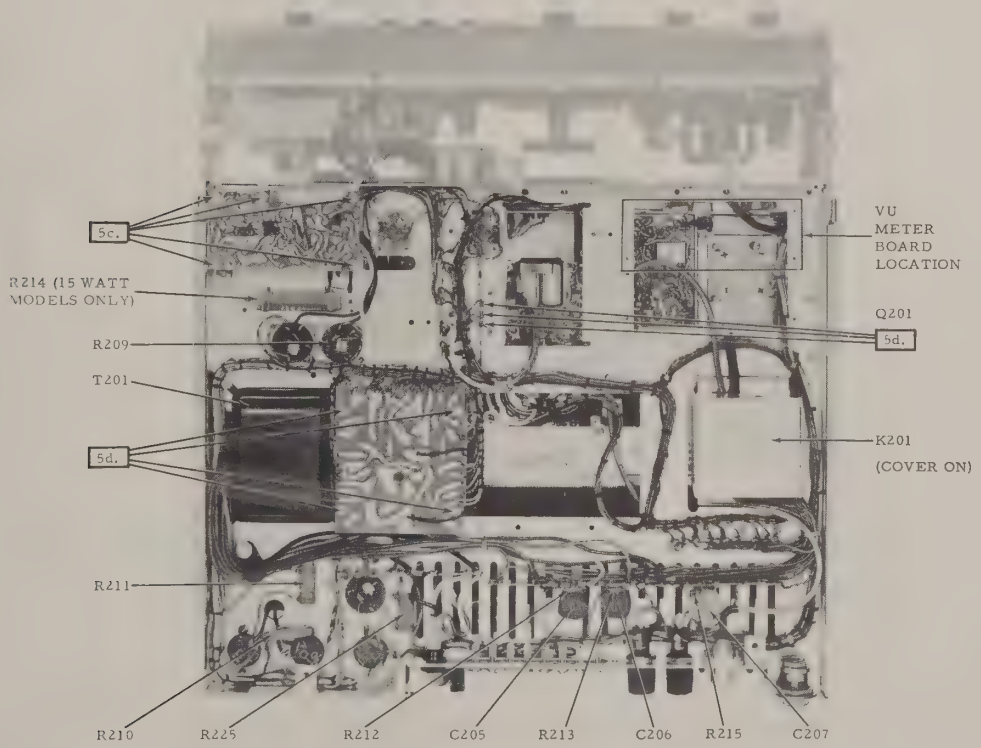


Figure 3.
Miscellaneous Components Location Detail
(Bottom View of Chassis, Cover Removed)

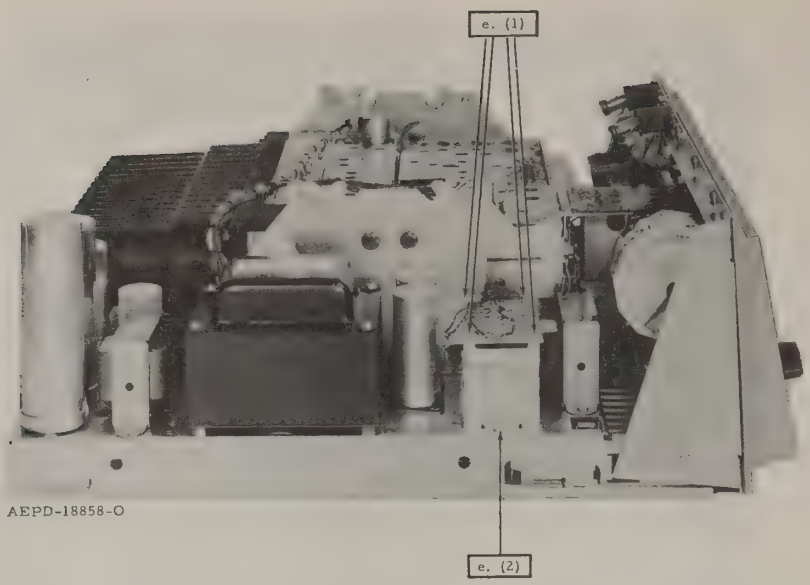


Figure 4.
Transmitter Channel Element
Assembly Removal

I. FINAL METER READINGS

ter is aligned or tested, final meter readings should be made and entered in

FCC re the table below are minimum except PA which is maximum. DO NOT exceed
e PA current. This is the maximum plate current to which the unit can be

1. Ra y the microampere scale reading by 10 to obtain actual PA plate current in
cia
2. Th are purely relative and do not give actual current or voltage measurement.
tec btained with 117 v ac input at the transformer primary.
3. Fr
che

1st Trip-ler Grid	2nd Doubler Grid	2nd Trip-ler Grid	I.P.A. Grid	PA Grid	PA Plate Current	PA Plate Voltage	Power Output
2	3	4	5	6	7	9	
15	10	15	15	18	20	600	30 watts
					15	400	15 watts

1. Mo
(av
res
2. Mo
3. Bi
len me as position 1; do not use for power output.
4. Fie

TUNING TOOLS

1. Set
2. Pla
3. Co
fro
Wh
ter

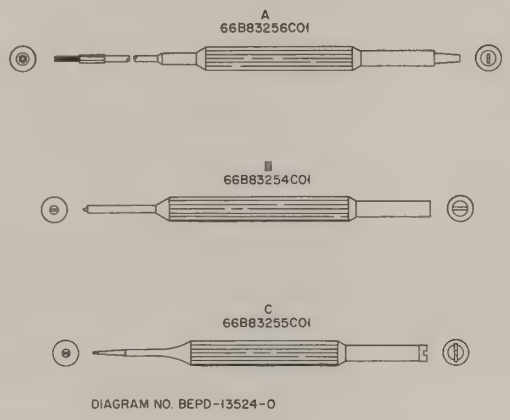


DIAGRAM NO. BEPD-13524-O

Ke
ged into

J. OSCILLATOR FREQUENCY ADJUSTMENT

"on-frequency" is the only oscillator adjustment necessary. Do this as fol-

ment temperature to stabilize at 25°C (77°F).
Refer t del S1075B Frequency Meter as a frequency standard. Set up the equipment
ement as described in the test equipment manual.
with no modulation. Disconnect the microphone and key the transmitter with
or the KEY contact. On "Private-Line" tone-coded squelch models, disable
ne generator by removing the "Vibrasender" resonant reed.
1. Co " capacitor for an "on-frequency" indication on the frequency standard. For
2. Tu odels, adjust the F2, F3 and F4 "WARP" capacitors (frequency switch in cor-

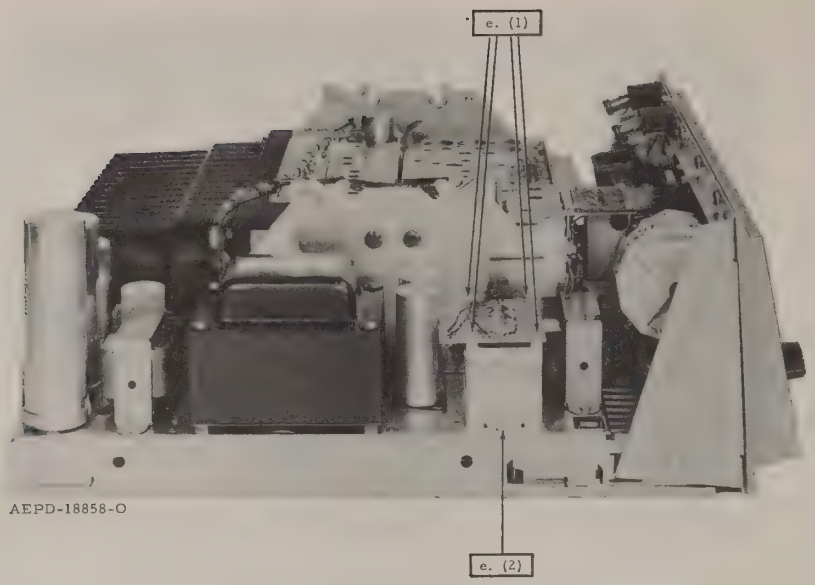


Figure 4.
Transmitter Channel Element
Assembly Removal

TRANSMITTER PRE-ALIGNMENT NOTES

A. EXCERPTS FROM FCC REGULATIONS

FCC regulations state that:

1. Radio transmitters may be tuned or adjusted only by persons holding a 1st or 2nd class commercial radiotelephone operator's license or by personnel working under their immediate supervision.
2. The r-f power output of a radio transmitter shall be no more than that required for satisfactory technical operation considering the area to be covered and the local conditions.
3. Frequency and deviation of a transmitter must be checked before it is placed in service and rechecked once each year thereafter.

B. TEST EQUIPMENT REQUIRED

1. Motorola Model S1056A-9A Portable Test Set with a Motorola Model TKN6025A Adapter Cable (available on separate order). A 0-50 microampere meter with 20,000 ohms equivalent series resistance may be used if a test set is not available.
2. Motorola Model TLN6845A Tuning Tool Kit.
3. Bird Model 43 "Thruline" RF Wattmeter and Motorola Model T1013A RF Load Resistor or equivalent.
4. Field strength meter.

C. HOW TO SET UP THE S1056-9A PORTABLE TEST SET

1. Set function selector switch to XMTR position.
2. Place the oscillator and meter reversing switch in the OFF position.
3. Connect the 20-pin meter cable plug to the test set; connect the adapter cable to the cable coming from the test set; connect the other end of the adapter cable to the transmitter metering socket. When the test set is not being used, disconnect the 20-pin metering cable to conserve internal battery life. The plug on the cable acts as an on-off switch completing the battery circuit.

D. HOW TO KEY THE TRANSMITTER

Key the transmitter with the XMTR ON switch on the test set or by talking into a microphone plugged into the test set. The transmitter may also be keyed by shorting the KEY contact to ground.

CAUTION

Do not key the transmitter for more than a few seconds at a time until it is properly tuned. Plate current is excessive in untuned stages and may cause damage. Turn on the transmitter for brief periods while reading the meter and making the adjustments.

E. FREQUENCY CALCULATIONS

crystal frequency in mc $\longrightarrow f_o = \frac{f_c}{36} \longleftarrow$ carrier frequency in mc

F. "IDC" CONTROL SETTING
(Transmitter Deviation)

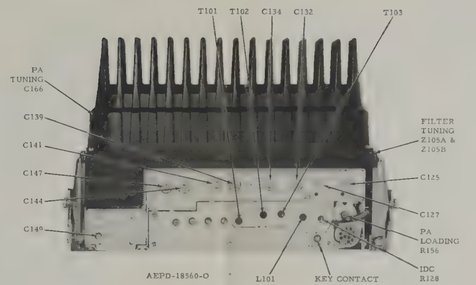
Refer to the reverse side of the Transmitter Alignment Procedure for setting of the IDC control.

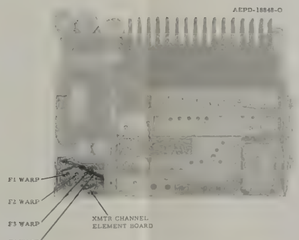
G. PRELIMINARY ADJUSTMENTS

1. Connect the r-f wattmeter in series with the dummy load to the antenna receptacle.
2. Turn the equipment on and allow at least one minute for warm-up

H. TRANSMITTER ADJUSTMENT

STEP	ADJUSTMENT	TEST SET SWITCH POSITION	STAGE AND TUNING PROCEDURE
1	PA LOADING R156	---	Set the PA LOADING potentiometer to minimum position (fully counterclockwise).
2	----	None	OSCILLATOR: FCC regulations require a periodic frequency check. If the check is due at this time, follow the OSCILLATOR FREQUENCY ADJUSTMENT procedure on this sheet; OTHERWISE NO ADJUSTMENT SHOULD BE MADE.
3	T101 T102 T103	---	Use hex end of tuning tool A. Set slugs to extreme counterclockwise position. (Top of slug just visible above coil form.) Turn slugs in T101 and T102 clockwise about five turns. Turn slug in T103 about thirteen turns.
4	T101 T102 T103	1	MODULATOR 1ST DOUBLER COLLECTOR: Use hex end of tuning tool A. Tune T101 and T102 carefully for peak reading on meter. Tune T103 for peak meter reading.
5	L101	2	1ST TRIPLER GRID: Use hex end of tuning tool A. Tune L101 for peak meter reading. There may be two positions which give peak reading. Use the one that gives the highest reading on meter position 2.
6	C125 C127	3	1ST TRIPLER PLATE--2ND DOUBLER GRID: Use the blade end of tuning tool A. Tune C125, then C127 for a peak meter reading. Repeat. (With no signal at the grid of the stage being metered, the meter will read fixed bias.)
7	C132 C134	4	2ND DOUBLER PLATE--2ND TRIPLER GRID: Use blade end of tuning tool C. Tune C132, then C134 for a peak meter reading. Repeat. (With no signal at the grid of the stage being metered, the meter will read fixed bias.)
8	C139 C141	5	2ND TRIPLER PLATE--I.P.A. GRID: Use blade end of tuning tool C. Tune C139, then C141 for a peak meter reading. Repeat. (With no signal at the grid of the stage being metered, the meter will read fixed bias.)
9	C144 C147 C149	6	I.P.A. PLATE--COUPLING LINK--FINAL GRID: Use blade end of tuning tool C. Tune C144, then C147, then C149 for a peak meter reading. Repeat. (With no signal at the grid of the stage being metered, the meter will read fixed bias.)
10	PA TUNING C166	---	PA PLATE: Use blade end of tuning tool A. Adjust PA TUNING for peak r-f output. The final power amplifier plate tank capacitor (C166) must be retuned after the transmitter has been keyed for at least two minutes. The capacitor is tuned for peak power output, and then detuned 1 watt by turning the capacitor shaft clockwise, i.e., in toward the final tube. Use r-f wattmeter or field strength meter. If a field strength meter is used, it should be detuned 2% of at least a three quarter scale reading on the field strength meter by the same method.
11	FILTER TUNING Z105	---	HARMONIC FILTER: Use slotted end of tuning tool B. Tune FILTER TUNING adjustments Z105A and Z105B for maximum power output. Repeat PA TUNING and repeat tuning Z105A and Z105B.
12	PA LOADING R156	---	FINALIZING ADJUSTMENTS: Use blade end of tuning tool A. Carefully repeak all adjustments, steps 3-11. Calculate the dc power input as follows: $P_{in} = I_p \times E_p$. I_p is PA position reading (0-50 ua scale) times 10,000. E_p is position 9 reading (0-1000 v dc scale) on the test set. The final plate power input is controlled by the PA LOADING rehostat. If P_{in} exceeds 120 watts in 30-watt models or 60 watts in 15-watt models reduce I_p by adjusting PA LOADING rheostat. Repeak Z105A and Z105B after the PA LOADING adjustment. DO NOT ADJUST PA LOADING RHEOSTAT FOR MORE THAN 60 or 120 WATTS INPUT TO FINAL (15-watt or 30-watt radios respectively).





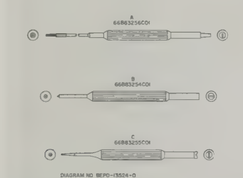
I. FINAL METER READINGS

1. Each time a transmitter is aligned or tested, final meter readings should be made and entered in a logbook.
2. All readings given in the taole below are minimum except PA which is maximum. DO NOT exceed the value given for the PA current. This is the maximum plate current to which the unit can be safely tuned. Multiply the microampere scale reading by 10 to obtain actual PA plate current in milliamperes.
3. Readings 1 through 6 are purely relative and do not give actual current or voltage measurement.
4. Meter readings are obtained with 117 v ac input at the transformer primary.

CIRCUIT METERED	1st Doubler Collector	1st Tripler Grid	2nd Doubler Grid	2nd Tripler Grid	I.P.A. Grid	PA Grid	PA Plate Current	PA Plate Voltage	Power Output
SWITCH POSITION	1	2	3	4	5	6	7	*	
METER READING	15	15	10	15	15	15	20 13	100 90	30 watts 15 watts

*PO position reads same as position 1; do not use for power output.

TUNING TOOLS



J. OSCILLATOR FREQUENCY ADJUSTMENT

Setting the oscillator "on-frequency" is the only oscillator adjustment necessary. Do this as follows:

1. Allow the channel element temperature to stabilize at 25°C (77°F).
2. Use the Motorola Model S1075B Frequency Meter as a frequency standard. Set up the equipment for frequency measurement as described in the test equipment manual.
3. Key the transmitter with no modulation. Disconnect the microphone and key the transmitter with the portable test set or the KEY contact. On "Private-Line" tone-coded squelch models, disable the "Private-Line" tone generator by removing the "Vibrasender" resonant reed.
4. Adjust the F1 "WARP" capacitor for an "on-frequency" indication on the frequency standard. For multiple frequency models, adjust the F2, F3 and F4 "WARP" capacitors (frequency switch in corresponding position).

he tone deviation should be (±) 0.33 to 0.66 kc (preceding the tripler) or 1 to 2 kc deviation f the actual carrier.

NOTE

Due to a slight increase in discriminator response at the lower frequencies, the oscilloscope will read high, thus, as indication of 0.9 to 1.8 squares (peak-to-peak) is equivalent to (±) 0.33 to 0.66 kc deviation preceding the tripler or 1 to 2 kc deviation of the actual carrier. This slight variation is only important when checking the tone deviation. When setting maximum transmitter deviation as described below, it may be ignored.

(2) Adjust the 1000 cps input signal to the transmitter audio input to 1 volt.

(3) With this input signal level, adjust the IDC control on the transmitter to provide a 10-square naximum limit) peak-to-peak recovered signal on the oscilloscope. This is equivalent to ±5 kc devia- on (preceding the tripler; see figure 3) or ±15 kc deviation of the actual carrier.

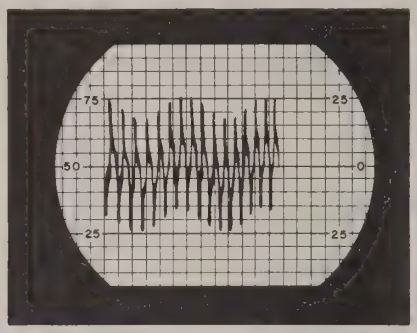


Figure 3.
15 KC Peak Deviation for
Combined PL Tone and 1000 CPS Modulation

EMERGENCY MEASUREMENT OF DEVIATION

If an audio oscillator is not available, a loud sustained whistle of approximately 1000 cycles can e used for a rough measurement of deviation. If this rough check indicates the need for resetting eviation, do so only under controlled conditions, using a 1000 cps tone as previously indicated. The alibration of the oscilloscope should always be performed with a steady controlled signal. Do not ttempt to calibrate the oscilloscope with a sustained whistle as waveform distortion will prevent an ccurate calibration.

OTHER MEANS FOR MEASUREMENT OF DEVIATION

Another accurate means of measuring transmitter deviation is to use the Motorola T1021B 'requency Meter and the Motorola S1058A or S1059A Test Set (with deviation meter) for measuring eviation. These units, properly used, permit the accurate measurement and setting of transmitter eviation from a peak-reading meter, which is unaffected by waveform. An oscilloscope is not equired with these instruments. With these devices, the transmitter deviation can be measured ccurately even with voice modulation.

DEVIATION CONSIDERATIONS

The foregoing procedure will insure that the transmitter will comply with FCC requirements for ıaximum deviation.

The importance of the correct deviation setting can not be overemphasized. Optimum system erformance demands accurate deviation setting, both from the standpoint that overdeviation will ıterfere with the user on the adjacent channel, and underdeviation may reduce system range.

AGE MEASUREMENTS WITH THE RADIO SET PROPERLY ADJUSTED

INPUT TO		FREQUENCY	METER POSITION	TEST SET METER READING
ntenna Disconnected			1	2.0 ua
ntenna Disconnected			2	20 ua
ntenna Disconnected			4	0
ntenna Disconnected			5	15 ua
ntenna Disconnected			6	10 ua
ntenna Connector		Carrier Freq.		20 DB Quieting
ntenna Connector		Carrier Freq.	1	15 ua
ase	1st Mixer	Carrier Freq.		20 DB Quieting
ollector	(Q2)	8 mc	1	15 ua
ase ollector	8 mc IF Transistor (Q3)	8 mc	1	15 ua
ase	2nd Mixer	8 mc	1	15 ua
ollector	(Q4)	0.455 mc	1	15 ua
ase ollector	455 kc Ampl. Transistor (Q5) in 455 kc filter	0.455 mc	1	15 ua
ase ollector	1st 455 kc IF Transistor (Q6)	0.455 mc	1	15 ua

STAGE MEASUREMENT NOTES

measurements made with signal generator tuned to the
uired frequency.
measurements, except antenna input, taken with 50 ohm
minated cable with a 0.003 uf capacitor in series.
st mixer quieting is measured with the r-f coax input lead
he 8 mc i-f strip disconnected.

1. Mot
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1. Set
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pho
4. Swit
5. Rot
The
abs

1. Set
2. Con
3. Tur
4. Kee
5. Rot
test
Set
rea

Test Eq

1. Mot
2. Mot

Procedu

1. Tur
2. Con
3. Set
4. Con
5. Tur
car
gen

IDC ADJUSTMENT

1. INTRODUCTION

Accuracy of test equipment is of prime importance to any user of radio communications equipment; but of equal importance is a knowledge of the characteristics of the measuring equipment under various conditions. The Motorola T1130A Series Station Monitor provides sufficient sensitivity and accuracy under conditions of variable environmental temperature, line voltage, and r-f input signal level to measure deviation with sinewave modulation in any wideband equipment. Like most meter-type measuring devices, the T1130A responds differently to different waveforms and is used only to calibrate an oscilloscope for measurement of the clipped and integrated waveform resulting from deviation control by Motorola's "IDC" circuit.

The Motorola S1079A Deviation Monitor/Frequency Synthesizer (used with the high resolution S1075B Digital Frequency Meter to constitute Model S1078A) provides a highly accurate means of measuring frequency deviation directly from the r-f output of the transmitter. The peak-reading deviation meter used in this unit has the high sensitivity necessary for measuring the low deviation of split-channel transmitters. It is also provided with sensitivity ranges appropriate for wideband measurements.

2. PROCEDURE WITH PEAK-READING DEVIATION MONITOR (Split-Channel or Wideband Equipment)

a. Test Equipment Required

(1) Motorola S1078A Digital Frequency Meter with Deviation Monitor/Frequency Synthesizer (or equivalent).

(2) Motorola Transistorized AC Voltmeter (or equivalent)

(3) Motorola Model TEK-1A Transistorized Tone Generator, 1000 cps

(4) Motorola Model S1056A-9A or TU546 Series Portable Test Set (necessary for "Private-Line" models only)

b. Setting Up Test Equipment

(1) To monitor transmissions for deviation adjustment, the antenna provided with the Digital Frequency Meter should be connected to the ANTENNA input of the Deviation Monitor/Frequency Synthesizer and placed within a few feet of the transmitter.

(2) Place the function switch on the Deviation Monitor/Frequency Synthesizer in the SET OSC. position.

(3) Set the local oscillator 500 kc above or below the assigned carrier frequency of the transmitter. The frequency of the local oscillator will appear on the digital readout.

(4) Place the function switch in the LIMITER 500 KC OUT position. Key the transmitter and observe the limiter reading on the front panel meter. If the meter pointer is above the red markings at 6/3 kc, the antenna input is adequate.

(5) Move the function switch to ZERO SET and zero the front panel meter.

(6) To measure deviation, set the function switch to the appropriate (16 KC, 8 KC, or 1.6 KC) position. When in the 1.6 KC position, the transmitter should remain keyed to prevent noise from pinning the meter.

c. Measurement and Setting of Transmitter Deviation

(1) For "Private-Line" transmitters, the tone deviation should be checked before the total modulation deviation is measured. This may be read on the deviation meter directly by keying the transmitter. DO NOT USE A LIVE MICROPHONE FOR CHECKING "PRIVATE-LINE" TONE DEVIATION. The deviation of the "Private-Line" tone should be 0.5 to 1.0 kc for split-channel models or 1.0 to 2.0 kc for wideband models.

(2) Feed a 1000 cps test tone into the transmitter audio input. Adjust the signal to 1 volt. A 0.33 uf capacitor should be placed in series with the tone generator output. An audio oscillator should be used for generation of this tone. The Motorola TEK-1A Transistorized Tone Generator is excellent for this purpose.

(3) With this input signal level, adjust the IDC control on the transmitter to provide a deviation reading of ±5 kc (split-channel) or ±15 kc (wideband) on the front panel meter.

3. PROCEDURE WITH CALIBRATED OSCILLOSCOPE (Wideband Equipment Only)

a. Test Equipment Required

(1) Motorola T1130A Series Station Monitor or equivalent.

NOTE

For 406-420 mc applications a special version of the Motorola FM Station Monitor must be used. This equipment is available on special order only. For further details, consult your Motorola representative.

(2) Motorola Transistorized AC Voltmeter (or equivalent)

(3) Motorola Model TEK-1A Transistorized Tone Generator, 1000 cps (or equivalent)

(4) Motorola Model T1015A General Purpose Oscilloscope or Model T1014B Wide Band Oscilloscope

(5) Motorola Model S1056A-9A or TU546 Series Portable Test Set for "Private-Line" transmitters

b. Setting Up Test Equipment

When using the T1130A Series Station Monitor with 420-470 mc transmitters, place the monitor antenna within a few feet of the transmitter. This enables the monitor receiver to pick up r-f from the stage preceding the final tripler, which is within the frequency range of the monitor receiver. As a result, the maximum frequency deviation measured will be ±5 kc (read on the 0-10 kc scale), which is one-third of the actual deviation of ±15 kc. It should be noted that calibration of the oscilloscope, as mentioned in the following paragraphs, takes this into consideration.

c. Oscilloscope Calibration

The first step in the measurement of the transmitter deviation is to calibrate the oscilloscope. This can be done by using the transmitter which is to be measured.

Proceed as follows:

(1) If the transmitter is a part of "Private-Line" station remove the "Vibrasender" resonant reed from its socket.

(2) Connect the oscilloscope to the monitor oscilloscope terminals, and set up the monitor controls in accordance with the monitor instruction manual.

(3) Turn the IDC control on the transmitter chassis to the full clockwise position.

(4) Feed a 1000 cps test tone into the transmitter audio input. Modulate the transmitter with this tone so adjusted that the deviation as read on the FM monitor deviation meter is ±2 kc. An audio oscillator must be used for generation of this tone, since a sinusoidal waveform is very important. The Motorola TEK-1A Transistorized Tone Generator is excellent for this purpose.

(5) Adjust the vertical gain of the oscilloscope so that the total recovered (peak-to-peak) audio pattern occupies some convenient height, e.g., four small squares, as shown in figure 1.

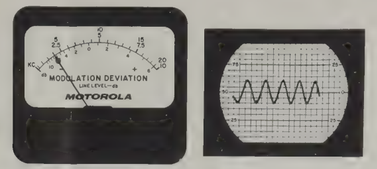


Figure 1.
Oscilloscope Calibration of Transmitter

Having calibrated the oscilloscope, there is no further need for the modulation deviation meter. Ignore its reading from this point on. It has already performed its important function of calibrating the oscilloscope.

With the oscilloscope calibrated as indicated, a recovered signal which occupies 10 squares (peak-to-peak) is equivalent to ±5 kc deviation at the stage preceding the final tripler.

d. Measurement and Setting of Transmitter Deviation (Carrier-Squelch Models)

Once the oscilloscope has been calibrated the transmitter deviation can be properly adjusted by the following method.

(1) Adjust the signal applied to the transmitter audio input to 1 volt.

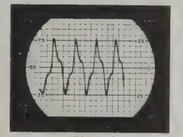


Figure 2.
15 KC Peak Deviation as seen on the Oscilloscope
(NOTE: Waveform is clipped fully)

(2) With this input signal level, adjust the IDC control on the transmitter to provide a 10-square peak-to-peak recovered signal on the oscilloscope. This is equivalent to ±5 kc deviation (preceding) the tripler; see figure 2) or ±15 kc deviation of the actual carrier.

e. Measurement and Setting of Transmitter Deviation ("Private-Line" Models)

Once the oscilloscope has been calibrated, the transmitted deviation can be properly adjusted by the following method.

(1) Replace the "Vibrasender" resonant reed in its socket and check the "Private-Line" tone deviation. This may be read directly from the oscilloscope by pressing the transmitter push-to-talk switch on the test set. DO NOT USE A "LIVE" MICROPHONE FOR CHECKING "PRIVATE-LINE" TONE DEVIATION. The tone deviation should be (±) 0.33 to 0.66 kc (preceding the tripler) or 1 to 2 kc deviation of the actual carrier.

NOTE

Due to a slight increase in discriminator response at the lower frequencies, the oscilloscope will read high, thus, as indication of 0.9 to 1.8 squares (peak-to-peak) is equivalent to (±) 0.33 to 0.66 kc deviation preceding the tripler or 1 to 2 kc deviation of the actual carrier. This slight variation is only important when checking the tone deviation. When setting maximum transmitter deviation as described below, it may be ignored.

(2) Adjust the 1000 cps input signal to the transmitter audio input to 1 volt.

(3) With this input signal level, adjust the IDC control on the transmitter to provide a 10-square (maximum limit) peak-to-peak recovered signal on the oscilloscope. This is equivalent to ±5 kc deviation (preceding the tripler; see figure 3) or ±15 kc deviation of the actual carrier.

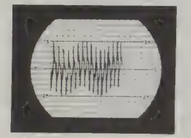


Figure 3.
15 KC Peak Deviation for
Combined PL Tone and 1000 Cps Modulation

4. EMERGENCY MEASUREMENT OF DEVIATION

If an audio oscillator is not available, a loud sustained whistle of approximately 1000 cycles can be used for a rough measurement of deviation. If this rough check indicates the need for resetting deviation, do so only under controlled conditions, using a 1000 cps tone as previously recommended. The calibration of the oscilloscope should always be performed with a steady controlled source. Do not attempt to calibrate the oscilloscope with a sustained whistle as waveform distortion will prevent an accurate calibration.

5. OTHER MEANS FOR MEASUREMENT OF DEVIATION

Another accurate means of measuring transmitter deviation is to use the Motorola T1021B Frequency Meter and the Motorola S1058A or S1078A Test Set (with deviation meter) for measuring deviation. These units, properly used, permit the accurate measurement and setting of transmitter deviation from a peak-reading meter, which is unaffected by waveform. An oscilloscope is not required with these instruments. With these devices, the transmitter deviation can be measured accurately even with voice modulation.

6. DEVIATION CONSIDERATIONS

The foregoing procedure will insure that the transmitter will comply with FCC requirements for maximum deviation.

The importance of the correct deviation setting can not be overemphasized. Optimum system performance demands accurate deviation setting, both from the standpoint that overdeviation will interfere with the user on the adjacent channel, and underdeviation may reduce system range.

A. TEST EQUIPMENT REQUIRED

1. Motorola Model S1056A-9A Portable Test Set with a Motorola Model TKN6025A Adapter Cable (available on separate order) must be used. A 0-50 microampere meter with 20,000 ohms equivalent series resistance may be used if a test set is not available.
2. Motorola Model T1034C Signal Generator (or equivalent).
3. Motorola Model TLN6845A Tuning Tool Kit. A small screwdriver may be used for some of the alignments.

B. HOW TO SET UP THE S1056A-9A PORTABLE TEST SET

1. Set function selector switch to RCVR position.
2. Switch on 455 kc crystal oscillator.
3. Connect the 20-pin meter cable plug to the test set; connect the adapter cable to the cable coming from the test set; connect the other end of the adapter cable to the receiver metering socket. When the test set is not in use, disconnect the 20-pin metering cable to conserve internal battery life. The plug on the cable acts as an on-off switch completing the battery circuit.
4. Connect the r-f extension cable to the test set; connect the r-f probe cable to the r-f extension cable.

C. HOW TO SET UP THE SIGNAL GENERATOR FOR 8 MC IF ALIGNMENT

1. Set up the signal generator according to the instructions supplied with the unit.
2. Remove the first oscillator channel element(s).
3. Connect the signal through a 0.003 uf capacitor to POINT 2 (8 mc i-f amplifier) as shown on the photo. (Generator output cable terminated in 50 ohms.)
4. Switch the test set to meter position 4.
5. Rotate the signal generator dial back and forth near the 8 mc reading. Watch the test set meter. The pointer should swing above and below the zero reading as the dial is rotated. Set the dial to absolute zero meter reading.

D. HOW TO SET UP THE SIGNAL GENERATOR FOR RF ALIGNMENT

1. Set up the signal generator according to the instructions supplied with the unit.
2. Connect the signal generator cable to the antenna input.
3. Turn the generator output up to maximum.
4. Keep the test set in position 4.
5. Rotate the signal generator dial back and forth near the assigned r-f carrier frequency. Watch the test set meter. The pointer should swing above and below the zero reading as the dial is rotated. Set the dial for exact zero meter reading. Be sure the generator frequency is kept at zero meter reading.

E. HOW TO MEASURE 20 DB QUIETING SENSITIVITY

Test Equipment Required

1. Motorola Model T1034C Signal Generator
2. Motorola Model S1056A-9A Portable Test Set

Procedure

1. Turn on the signal generator and allow it to warm up for at least one hour.
2. Connect the meter cable from the test set to the receiver METER receptacle on the chassis.
3. Set the RCVR-XMTR-ACCESS switch to the RCVR position. Set the position selector to position 4.
4. Connect the signal generator output through a 6 db pad to the antenna receptacle on the radio set.
5. Turn up the generator output and rotate the generator dial back and forth near the assigned r-f carrier frequency. The test set meter pointer should swing above and below the zero mark as the generator dial is rotated. Set the dial for exact zero reading.
6. Reduce the signal generator output to zero (i.e., no signal input). Set the position selector switch to position 11 (AUDIO).
7. Unsquelch the receiver by turning the SQUELCH control fully counterlcockwise.
8. Adjust the VOLUME control for a 1.0 volt reading on the test set meter.
9. Now, turn up the signal generator output until the test set meter reading drops to 0.1 volt. Note the setting of the signal generator output control. This value (less 6 db for the attenuation of the pad) in microvolts is the 20 db quieting sensitivity for the receiver.

F. TEST SET SELECTOR SWITCH POSITIONS

S1056A-9A TEST SET	1	2	4	5	6	11
CIRCUIT METERED	455 KC IF Ampl. #1	455 KC IF Ampl. #3	Discrim. Secondary	Discrim. Primary	1st Osc.	Audio

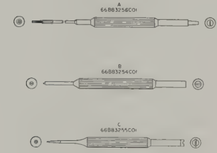
G. FREQUENCY CALCULATIONS

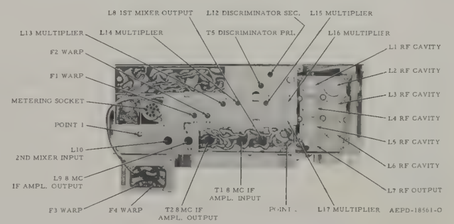
$$f_{o1} = \frac{f_c - 8\ MC}{27}$$

where: f_{o1} = 1st oscillator crystal frequency

f_c = carrier frequency

TUNING TOOLS





H. RECEIVER ALIGNMENT

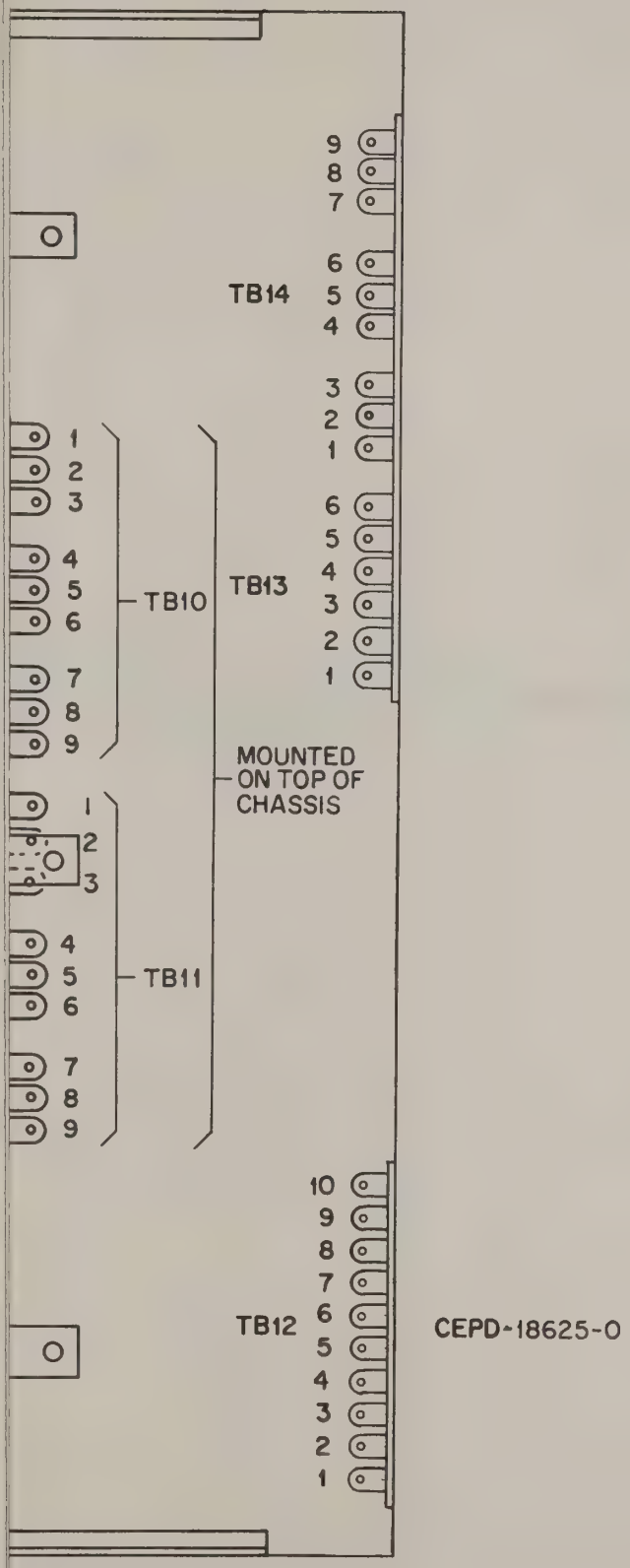
STEP	STAGE AND PROCEDURE
1	Remove the first oscillator channel element(s) before performing receiver alignment.
2	DISCRIMINATOR PRIMARY -- Set up the test set as described in paragraph B at the left. Insert a 2 uuf capacitor in series with the r-f probe. Place the r-f probe on the input to the 455 kc i-f filter (POINT 1). Adjust L12 so that the slug is very close to the top of the coil. Adjust T5 for a maximum indication on the test set meter in position 5. Use screwdriver end of tuning tool B.
3	DISCRIMINATOR SECONDARY -- Use the "0" center scale on the test set. Adjust L12 for absolute zero on the "0" center (top) scale with the switch in position 4. Use screwdriver end of tuning tool B. This is a critical adjustment and should be exactly on zero. Remove the r-f probe.
4	8 MC IF -- Set up the test equipment as described in paragraph C at the left of this page. Use the minimum 8 mc signal that will produce a linear increase in test set meter reading with an increase in signal strength (selector switch in position 1). Tune L10, L9, T2, T1 and L8 in that order, for a maximum test set meter indication with the selector switch in position 1. Use the large end of tuning tool C. Replace the first oscillator channel element(s) after alignment is completed.
5	FIRST OSCILLATOR -- Uncouple the signal generator. Adjust coils L13 and L14 for a maximum meter indication in position 6. Use hex end of tuning tool A.
6	ON-FREQUENCY ADJUSTMENT -- Transmit a carrier from the transmitter which this receiver is normally intended to receive. If the transmitter and receiver are on the same frequency and if the transmitter is known to be "on-frequency" connect the antenna to the radio set antenna connector, and short the KEY contact located on the exciter board. Test set position 1 should indicate a rise when the transmitter is "on". Check the meter indication in position 4; zero indicates "on-frequency". Set F1 "warp" capacitor for exact "0" center meter indication. On multiple frequency receivers, adjust F2, F3 and F4 "warp" capacitors for the corresponding frequency.
7	MULTIPLIER -- Set up the signal generator as described in paragraph D at the left. Apply as much signal as is necessary for a small indication in meter position 1. Align coil L15 (use hex end of tuning tool A) and coils L16, L17 (use screwdriver end of tuning tool C) for maximum in position 1.
8	RF DECK -- Set up the signal generator as described in paragraph D at the left. Apply as much signal as is necessary for a small indication in meter position 1. If no indication can be obtained in meter position 1, adjust slugs L1 through L6 flush with the top of the r-f casting and turn slug L7 three turns from the bottom. Use screwdriver end of tuning tool C. Tune L1 through L6 clockwise 1/2 turn until a reading in meter position 1 is obtained. Tune L1, L2, L3, L4, L5, L6 and L7, in that order, for maximum in meter position 1. Reduce generator output as required. Continue the above procedure until all slugs are tuned for maximum in meter position 1. Turn L1 through L6 counterlcockwise 1/4 turn. Set the signal generator output for a reading of about 15 ua on position 1 and repeak twice L1 through L7, in that order, for maximum in meter position 1.

I. AVERAGE STAGE MEASUREMENTS WITH THE RADIO SET PROPERLY ADJUSTED

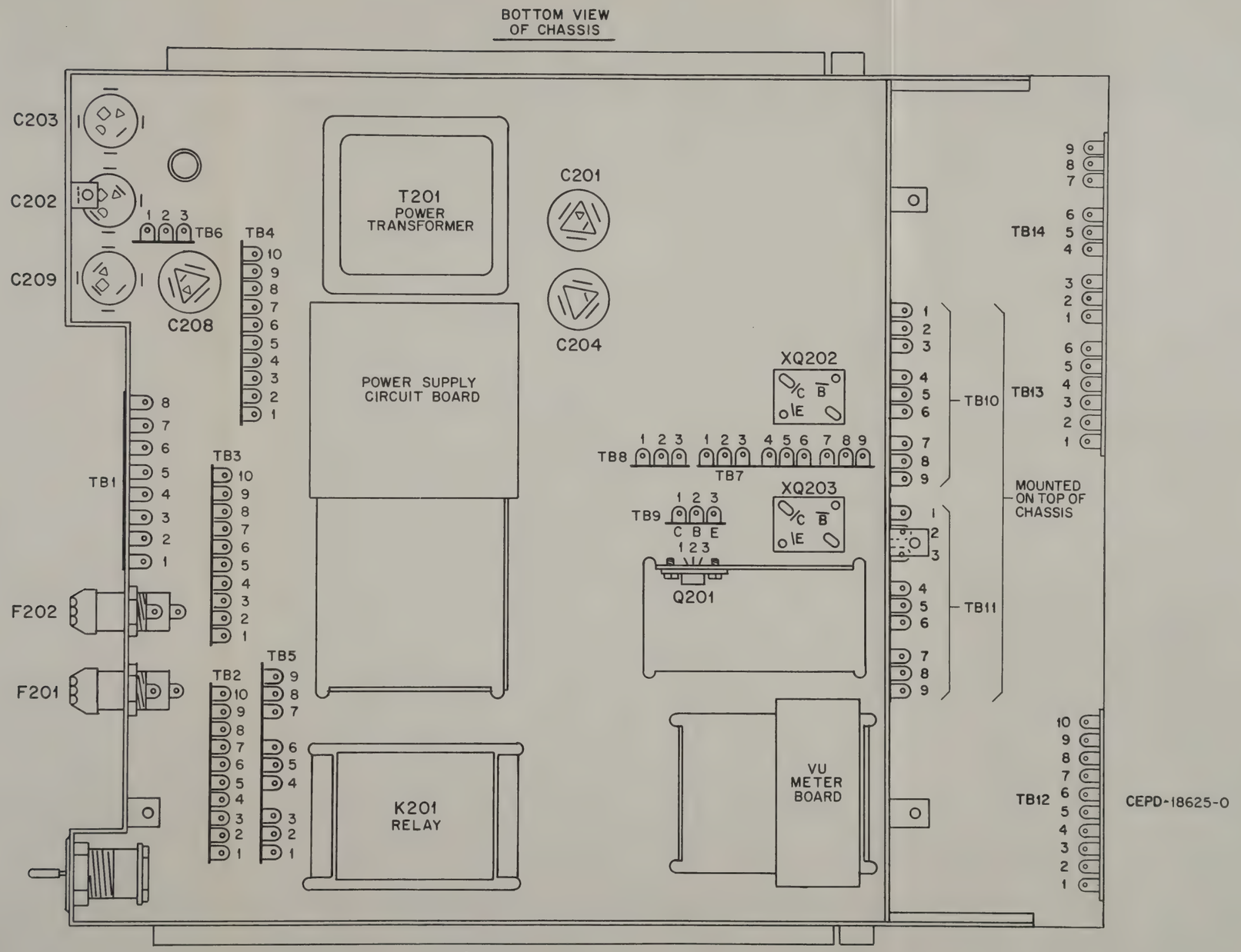
APPROXIMATE MICROVOLT INPUT	INPUT TO		FREQUENCY	METER POSITION	TEST SET METER READING
No Signal	Antenna Disconnected			1	2.0 ua
No Signal	Antenna Disconnected			2	20 ua
No Signal	Antenna Disconnected			4	0
No Signal	Antenna Disconnected			6	15 ua
No Signal	Antenna Disconnected			4	20 ua
0.5	Antenna Connector		Carrier Freq.		20 DB Quieting
0.6	Antenna Connector		Carrier Freq.	1	15 ua
0.5	Base	1st Mixer	Carrier Freq.		20 DB Quieting
140	Collector	(Q2)	8 mc	1	15 ua
12.5	Base	8 mc IF			
180	Collector	Transistor (Q3)	8 mc	1	15 ua
8.0	Base	2nd Mixer	8 mc	1	15 ua
250	Collector	(Q4)	0.455 mc	1	15 ua
110	Base	455 kc Ampl. Transistor (Q5) in 455 kc filter	0.455 mc	1	15 ua
2200	Collector				
1600	Base	1st 455 kc IF Transistor (Q6)	0.455 mc	1	15 ua
60000	Collector				

STAGE MEASUREMENT NOTES

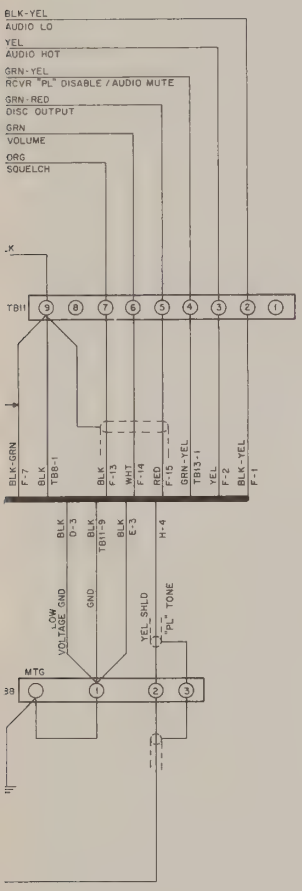
1. All measurements made with signal generator tuned to the required frequency.
2. All measurements, except antenna input, taken with 50 ohm terminated cable with a 0.003 uf capacitor in series.
3. First mixer quieting is measured with the r-f coax input lead to the 8 mc i-f strip disconnected.



Terminal Board Location and
Pin Assignment Detail
Motorola No. EPD-18625-O
6/16/67-RS

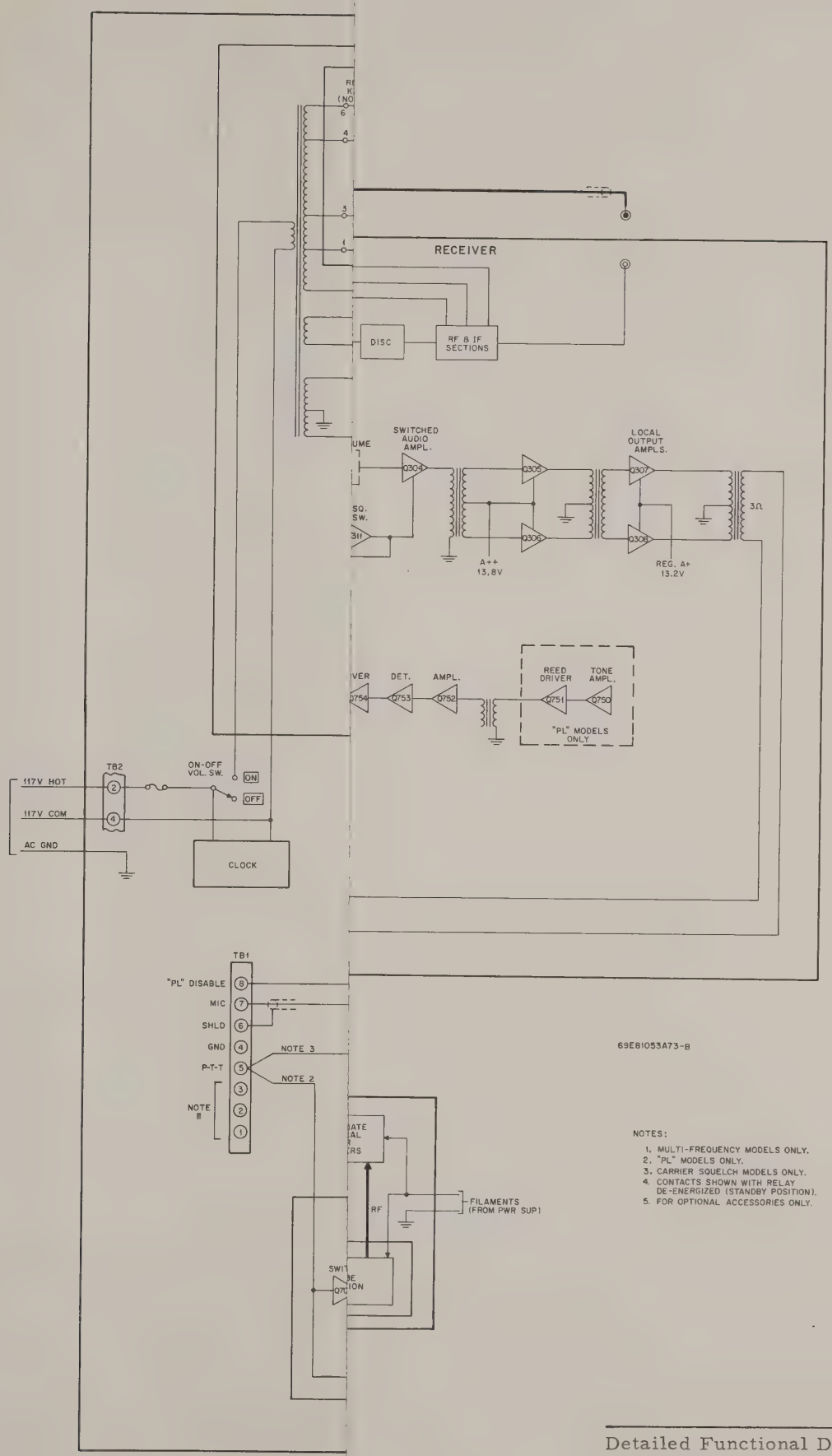


Terminal Board Location and
Pin Assignment Detail
Motorola No. EPD-18625-O
6/16/67-RS



NOTES:

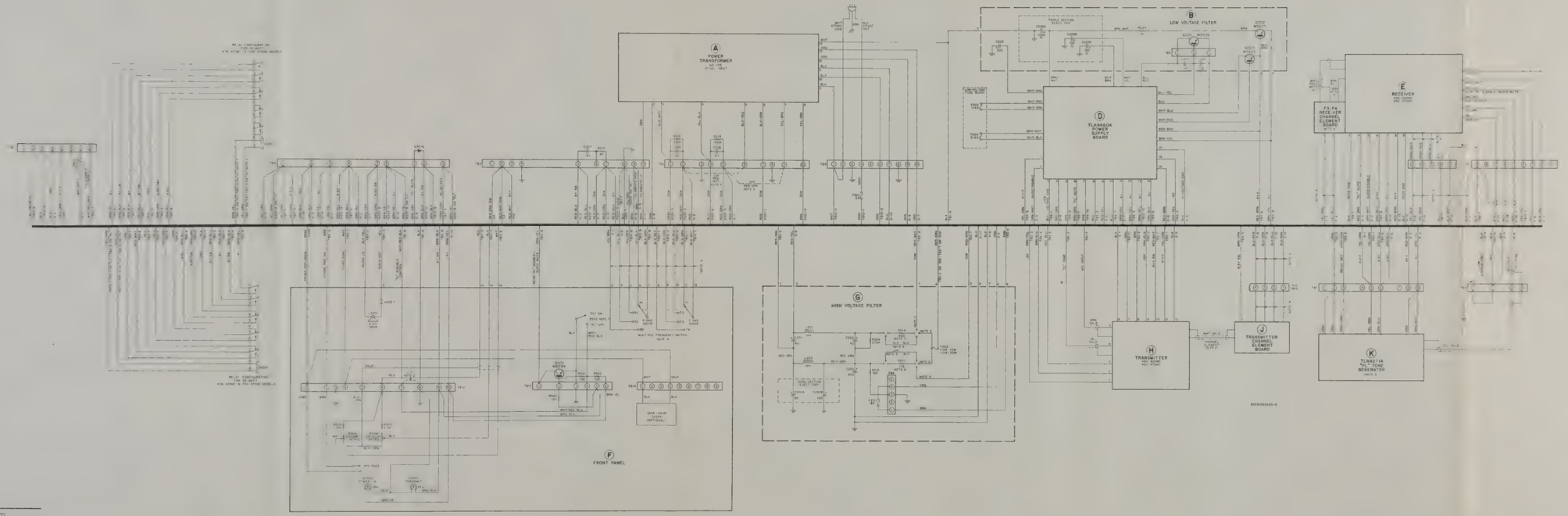
1. "CS" = CARRIER-SQUELCH MODELS.
   "PL" = "PRIVATE-LINE" MODELS.
2. USED ON CARRIER-SQUELCH MODELS ONLY.
3. USED ON "PRIVATE-LINE" MODELS ONLY.
4. USED ON MULTIPLE-FREQUENCY MODELS ONLY.
5. USED ON 15 WATT MODELS ONLY.
6. USED ON 30 WATT MODELS ONLY.
7. TO FURNISH AUDIO TO TB1-3 (FOR OPTIONAL ACCESS.) DISCONNECT THE LUG FROM THE SPEAKER (LS501) AND CONNECT IT TO TB10-6.



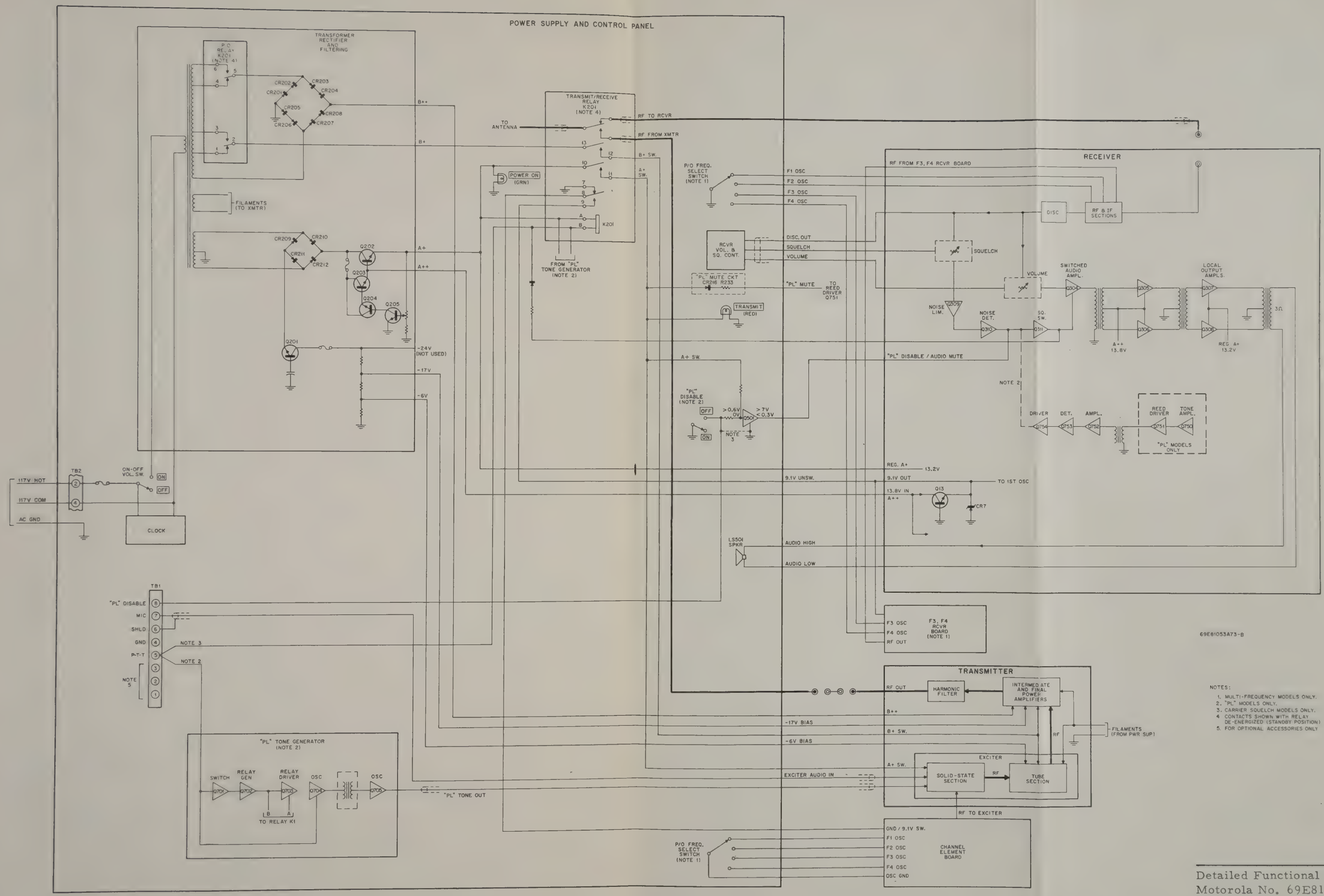
NOTES:

1. MULTI-FREQUENCY MODELS ONLY.
2. "PL" MODELS ONLY.
3. CARRIER SQUELCH MODELS ONLY.
4. CONTACTS SHOWN WITH RELAY DE-ENERGIZED (STANDBY POSITION).
5. FOR OPTIONAL ACCESSORIES ONLY.

Detailed Functional Diagram
Motorola No. 69E81053A73-B
10/1/68-RS



Intercabling Diagram
Motorola No. 63E81053A63-G
10/1/68-RS



NOTES:

1. MULTI-FREQUENCY MODELS ONLY.
2. "PL" MODELS ONLY.
3. CARRIER SQUELCH MODELS ONLY.
4. CONTACTS SHOWN WITH RELAY DE-ENERGIZED (STANDBY POSITION)
5. FOR OPTIONAL ACCESSORIES ONLY

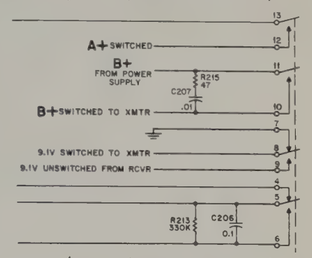
Detailed Functional Diagram
Motorola No. 69E81053A73-B
10/1/68-RS

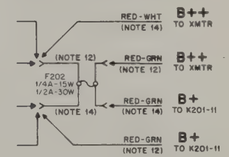
TOROLA ART NO.	DESCRIPTION
80901A92	plate coupling; incl. C139, L110 (TLN8316A, TLN8891A)
V80902A18	plate coupling incl. C139, C1006, L110 (TLN8315A, TLN8890A)
82617E01	grid coupling
82618E01	grid coupling
80901A97	I.P.A. plate; incl. C144, L115
835456	choke; 0.32 uh
82604E01	I.P.A. coupling loop
82797E01	P.A. grid coupling
82796E01	P.A. grid tuning
82794E01	P.A. grid tuning
82613G01	choke; 0.288 uh
80758A41	P.A. plate tank; incl. C166 and 7C83808C01 BRACKET, tank 39B83809C01 PIN, contact: 2 req'd 1V80726A35 PLATE & BUSHING ASSY. 14B83810C01 INSULATOR stand-off 4K868475 INSULATOR ASSY.: 4 req'd 7C83462D03 BRACKET, thermo 41B82790E01 SPRING, grounding 4C82418B68 WASHER, insulator 2B83677G01 NUT, lock (TLN8316A, TLN8891A)
V80773A22	P.A. tank; incl. C166 and 7C83959E01 BRACKET, tank 39B83809C01 PIN, contact 2 req'd 1V80777A26 PLATE & BUSHING ASSY. 14B83810C01 INSULATOR, stand-off: 2 req'd 4K868475 INSULATOR ASSY: 4 req'd 7C83462D03 BRACKET, thermo 41A83059G01 SPRING, grounding 4C82418B83 WASHER, insulator 2B83677G01 NUT, lock (TLN8315A, TLN8890A)
A82626E01	P.A. plate coupling (TLN8316A, TLN8891A)
4B82580G01	P.A. plate coupling (TLN8315A, TLN8890A)
K858989	choke; 0.176 uh
K858989	choke; 0.176 uh (TLN8315A, TLN8890A)
	CONNECTOR, plug:
B82331G01	male; single cont.
	RESISTOR, fixed: ±10%; 1/2 w unl stated
6031	100K
6022	330
6434	27K
5644	82K
129239	2.7 meg; 1/4 w
6320	10K
6074	68K
5618	3.9K; 1 w
6270	220
6397	22K
2073	2.2 meg ±5%
6326	100
5686	2.7K; 1 w
6446	4.7 meg
5410	33K
5591	18K
6326	100 (TLN8316A, TLN8891A)
C83807C01	var: 5K; 12.5 w
C82177B02	32 ±5%; 5 w
K847359	2 ±2%; 1 w
D82177B15	4.5K; 7 w
	ELECTRON TUBE:
A83735A02	type 12BY7
95S164A02	type 12BY7A
R121A01	type 7551
S113A01	type 6939
S136A02	type 8643 (TLN8315A, TLN8316A)
97S136A01	type 8643 (TLN8890A, TLN8891A)

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		SOCKET, electron tube: female:
XV103, 104	9K858977	9 cont.
XV105, 106	9C82057E01	8 cont.
XV107	9B82264A01	7 cont.
		FILTER, harmonic:
Z105	1V80758A38	incl. P103, P104 (TLN8316A, TLN8891A)
	or1V80731A35	incl. P103, P104 (TLN8315A, TLN8890A)

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION	REFER TO CIRCUIT BOARD
A	TLE1061AA-1 TLE1062AA-2	V103	WAS 95R319A01, TYPE 8077	1ST TRIPLER	NONE
B	TLN8660A-1				POWER SUPPLY BD PEPD-18933-A
	TLN8621A-1 TLN8622A-1	R215, C207	RELOCATED, CIRCUIT WAS AS SHOWN BELOW	K201	NONE
		F202	CIRCUIT REVISED. CIRCUIT WAS AS SHOWN BELOW	POWER SUPPLY	
B1	TLN8270AA				"PL" DECODER BD PEPD-18623-A
C	TTE1061AA-2 TTE1062AA-3	C149	WAS 19B82550E01, 3-7 uuf	V107 CIRCUITRY	NONE
C1	TTE1161AA TTE1162AA		ADDED MODELS	SCHEMATIC DIAGRAM & PARTS LIST	NONE
D	TLN8660A-2				POWER SUPPLY BD. PEPD-18933-B
E	TLN8676A-2	F205	ADDED	T201 WINDING B	NONE
F	TLN8626A-2 TLN8525A-2				AUDIO & SQUELCH BDS. PEPD-18176-B PEPD-18619-A
G	TLN8676A-3	C219	ADDED	Q201 BASE	NONE





REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

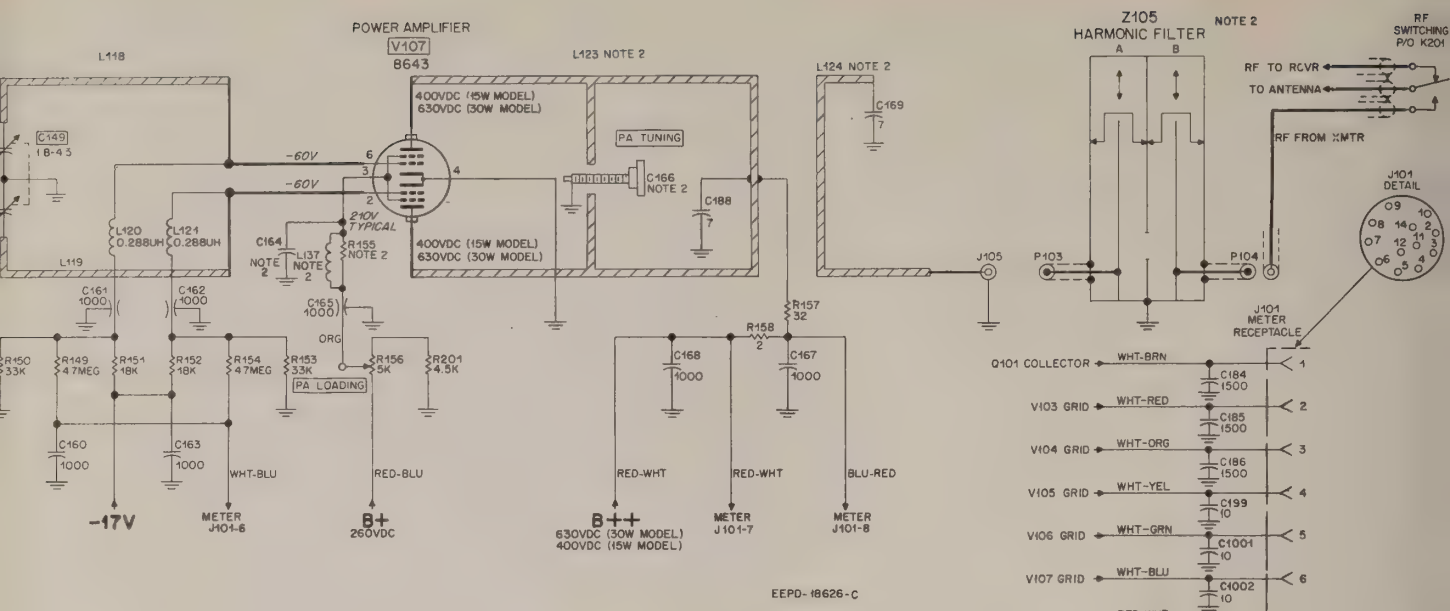
PARTS LIST

PARTS LISTS FOR PRINTED CIRCUIT BOARDS ARE ON THE BACK OF THE CORRESPONDING PRINTED CIRCUIT BOARD DETAILS

TRANSMITTER

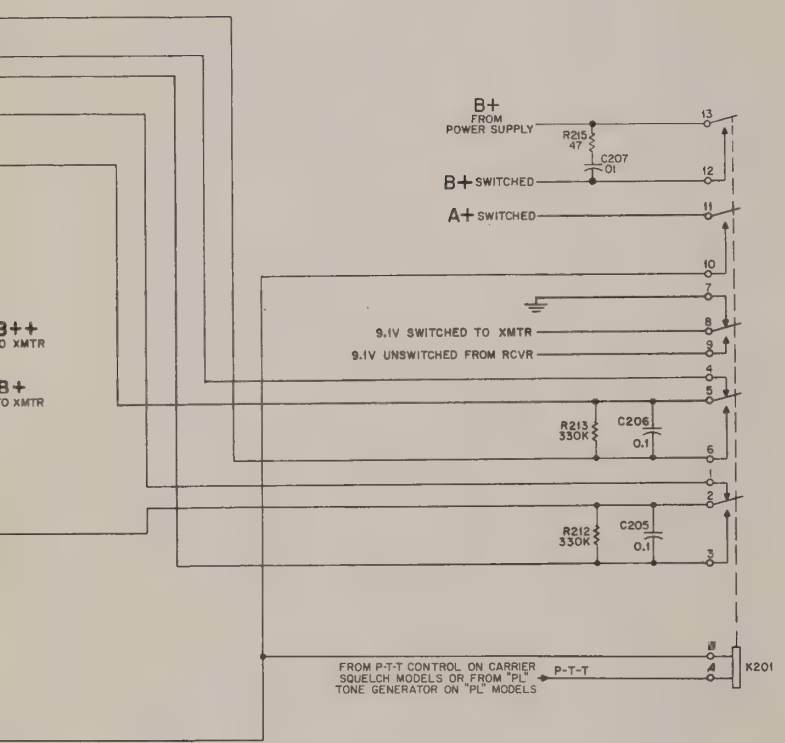
TLN8890A Transmitter Chassis Kit (406-420 MC)
TLN8891A Transmitter Chassis Kit (450-470 MC)
TLN8315A Transmitter Chassis Kit (406-420 MC)
TLN8316A Transmitter Chassis Kit (450-470 MC) EPD-15274-G

		CAPACITOR, fixed: uuf ±10%; 500 v; unl stated
C125	20C82984E01	var: 3-12; NP0 p/o L104
C127	20C82984E01	var: 3-12; NP0 p/o L105
C132	19C475605	var: 2.3-14.2; p/o L107
C134	19K859089	var: 2.7-6.75; p/o L108
C135	21B837745	820
C136	21C82187B07	470
C137, 145, 146, 148, 152, 153, 155, 156, 157, 159, 161, 162, 165, 170, 174, 176, 179, 181, 183, 198	21B861219	1000 GMV; coded RED
C138	21K850510	470; 300 v; p/o L104
C139	19K859089	var: 2.7-6.75; p/o L111
C140	21K848525	16 ±5%; NP0; p/o L104 (TLN8316A, TLN8891A)
	or21K840365	24 ±5%; NP0 (TLN8315A, TLN8890A)
C141	19B82475E01	var: 2.7-6.75
C142	21K847874	12 ±5%; NP0; p/o L105 (TLN8316A, TLN8891A)
	or21K840849	20 ±5%; NP0 (TLN8315A, TLN8891A)
C143	21C82187B07	470; p/o L105
C144	19K859089	var: 2.7-6.75; p/o L114
C147	19A820263	var: 1.7-8.7
C149	19B82550E03	var: 1.8-4.5 uuf; 850 v
C150, 151	21K847087	220; 300 v; p/o L108
C154, 158, 160, 163	21C83191A01	1000 +100-0%
C164	21K851846	8 ±0.25 uuf; NP0 (TLN8316A, TLN8891A)
C166	1B82584E01	plate and screw assy; p/o L123 (TLN8316A, TLN8891A)
	or 1B82584E03	plate and screw assy; p/o L123 (TLN8315A, TLN8890A)
C167, 168	21C83805C01	1000 +100-0%; 100 v
C169, 188	21C82880E17	7; 850 v
C171, 172, 175, 177, 180, 182, 184, 185, 186, 187	21B800801	1500
C173, 178, 199, 1001, 1002	21R410063	10 ±0.5 uuf; NP0
C1005	21C82450B17	2.2 ±5%; (TLN8315A, TLN8890A)
C1006	21C82450B08	1.2 ±5%; (TLN8315A, TLN8890A)
C1007	21C82450B33	0.56 ±5%; (TLN8315A, TLN8890A)
		CONNECTOR, receptacle:
J101	9C857358	female; 12 cont.
J105	9C83663C01	female; single cont.
		COIL, RF:
L103	24K859166	7.3 uh
L104	24V80901A76	plate coupling; incl. C125, 138, 140 (TLN8316A, TLN8891A)
	or24V80902A15	plate coupling; incl. C125, 138, 140 (TLN8315A, TLN8890A)
L105	24V80901A77	grid coupling; incl. C127, 142, 143 (TLN8316A, TLN8891A)
	or24V80902A16	grid coupling; incl. C127, 142, 143 (TLN8315A, TLN8890A)
L106	24D859162	choke; 1.2 uh
L107	24V80901A90	plate coupling; incl. C132
L108	24V80901A91	grid coupling; incl. C134, 150, 151 (TLN8316A, TLN8891A)
	or24V80902A17	grid coupling; incl. C134, 150, 151, C1005 (TLN8315A, TLN8890A)
L109	24A82998G01	choke; (TLN8315A, TLN8890A)
L110	24A835456	choke; 0.32 uh; p/o L111
L111	24V80901A92	plate coupling; incl. C139, L110 (TLN8316A, TLN8891A)
	or24V80902A18	plate coupling incl. C139, C1006, L110 (TLN8315A, TLN8890A)
L112	24A82617E01	grid coupling
L113	24A82618E01	grid coupling
L114	24V80901A97	I.P.A. plate; incl. C144, L115
L115	25A835456	choke; 0.32 uh
L116	24A82604E01	I.P.A. coupling loop
L117	24A82797E01	P.A. grid coupling
L118	24A82796E01	P.A. grid tuning
L119	24A82794E01	P.A. grid tuning
L120, 121	24B82613G01	choke; 0.288 uh
L123	1V80758A41	P.A. plate tank; incl. C166 and 7C83808C01 BRACKET, tank 39B83809C01 PIN, contact: 2 req'd 1V80726A35 PLATE & BUSHING ASSY. 14B83810C01 INSULATOR stand-off 4K868475 INSULATOR ASSY.: 4 req'd 7C83462D03 BRACKET, thermo 41B82790E01 SPRING, grounding 4C82418B68 WASHER, insulator 2B83677G01 NUT, lock (TLN8316A, TLN8891A)
	or1V80773A22	P.A. tank; incl. C166 and 7C83959E01 BRACKET, tank 39B83809C01 PIN, contact 2 req'd 1V80777A26 PLATE & BUSHING ASSY. 14B83810C01 INSULATOR, stand-off: 2 req'd 4K868475 INSULATOR ASSY: 4 req'd 7C83462D03 BRACKET, thermo 41A83059G01 SPRING, grounding 4C82418B83 WASHER, insulator 2B83677G01 NUT, lock (TLN8315A, TLN8890A)
L124	24A82626E01	P.A. plate coupling (TLN8316A, TLN8891A)
	or24B82580G01	P.A. plate coupling (TLN8315A, TLN8890A)
L125 thru 130	24K858989	choke; 0.176 uh
L137	24K858989	choke; 0.176 uh (TLN8315A, TLN8890A)
		CONNECTOR, plug:
P103, 104	28B82331G01	male; single cont.
		RESISTOR, fixed: ±10%; 1/2 w unl stated
R114	6S6031	100K
R133	6S6022	330
R134	6S6434	27K
R135	6S5644	82K
R136, 140	6S129239	2.7 meg; 1/4 w
R137	6S6320	10K
R138, 139	6S6074	68K
R141	6S5618	3.9K; 1 w
R142	6R6270	220
R143, 144	6S6397	22K
R145, 146	6S2073	2.2 meg ±5%
R147	6S6326	100
R148	6S5686	2.7K; 1 w
R149, 154	6S6446	4.7 meg
R150, 153	6S5410	33K
R151, 152	6S5591	18K
R155	6S6326	100 (TLN8316A, TLN8891A)
R156	18C83807C01	var: 5K; 12.5 w
R157	17C82177B02	32 ±5%; 5 w
R158	17K847359	2 ±2%; 1 w
R201	17D82177B15	4.5K; 7 w
		ELECTRON TUBE:
V103	65A83735A02	type 12BY7
	or95S164A02	type 12BY7A
V104	97R121A01	type 7551
V105, 106	97S113A01	type 6939
V107	97S136A02	type 8643 (TLN8315A, TLN8316A)
	or97S136A01	type 8643 (TLN8890A, TLN8891A)
		SOCKET, electron tube: female:
XV103, 104	9K858977	9 cont.
XV105, 106	9C82057E01	8 cont.
XV107	9B82264A01	7 cont.
		FILTER, harmonic:
Z105	1V80758A38	incl. P103, P104 (TLN8316A, TLN8891A)
	or1V80731A35	incl. P103, P104 (TLN8315A, TLN8890A)



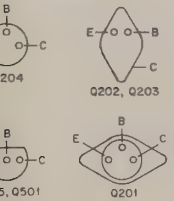
EEPD-18626-C

RELAY CONFIGURATION



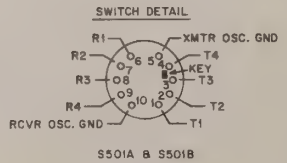
CHASSIS MODEL NO.	SUFFIX	FREQUENCY RANGE	POWER OUTPUT	POWER SUPPLY BOARD NO.	SUFFIX
TLN8676A	3	406-420MC	15 & 30 WATT	TLN8660A	2
		450-470MC			

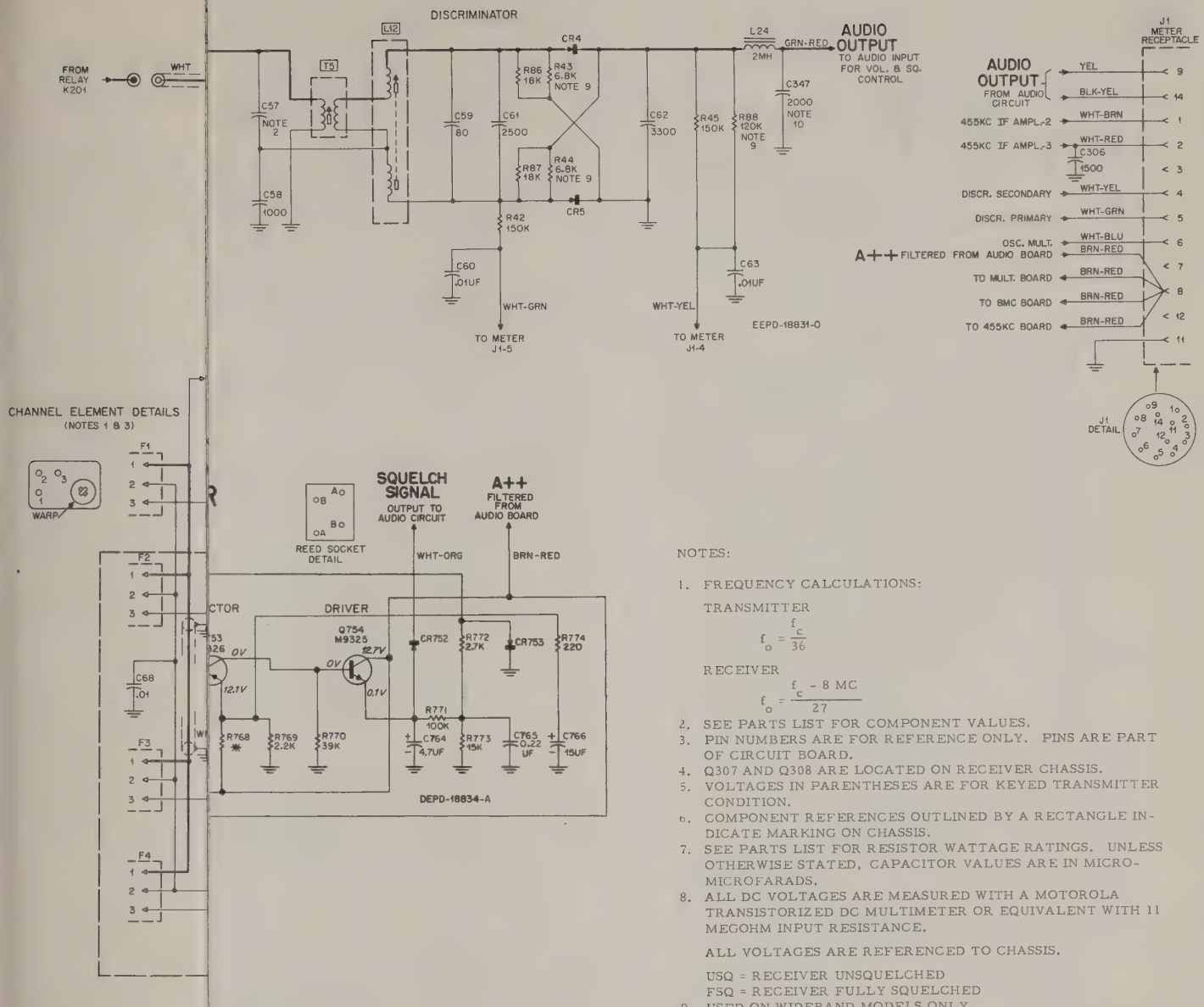
TRANSISTOR DETAILS



RELAY DETAIL

SWITCH DETAIL





NOTES:

1. FREQUENCY CALCULATIONS:

   TRANSMITTER

   $$f_o = \frac{f_c}{36}$$

   RECEIVER

   $$f_o = \frac{f_c - 8\ MC}{27}$$

2. SEE PARTS LIST FOR COMPONENT VALUES.
3. PIN NUMBERS ARE FOR REFERENCE ONLY. PINS ARE PART OF CIRCUIT BOARD.
4. Q307 AND Q308 ARE LOCATED ON RECEIVER CHASSIS.
5. VOLTAGES IN PARENTHESES ARE FOR KEYED TRANSMITTER CONDITION.
6. COMPONENT REFERENCES OUTLINED BY A RECTANGLE INDICATE MARKING ON CHASSIS.
7. SEE PARTS LIST FOR RESISTOR WATTAGE RATINGS. UNLESS OTHERWISE STATED, CAPACITOR VALUES ARE IN MICRO-MICROFARADS.
8. ALL DC VOLTAGES ARE MEASURED WITH A MOTOROLA TRANSISTORIZED DC MULTIMETER OR EQUIVALENT WITH 11 MEGOHM INPUT RESISTANCE.

   ALL VOLTAGES ARE REFERENCED TO CHASSIS.

   USQ = RECEIVER UNSQUELCHED
   FSQ = RECEIVER FULLY SQUELCHED
9. USED ON WIDEBAND MODELS ONLY.
10. USED ON SPLIT-CHANNEL MODELS ONLY.
11. Z2 IS A POTTED ASSEMBLY AND IS REPLACEABLE AS A UNIT.
12. USED IN 15 WATT MODELS ONLY.
13. TOP VOLTAGE IS WITH FUNCTION ACTIVATED. BOTTOM VOLTAGE IS STANDBY.

    $A > B$ = A IS GREATER THAN B
    $A < B$ = A IS LESS THAN B
14. USED IN 30 WATT MODELS ONLY.
15. SINGLE-FREQUENCY MODELS ONLY.
16. DIODE MOUNTED ON TERMINAL BOARD TB5-7, 8.

EPD-18766-A

MODEL TABLE

RECEIVER

MODEL	FREQ. RANGE	CHANNEL SPACING	TYPE OF SQUELCH
TRE1112AA	450-470 MC	50 KC	CARRIER
TRE1112AB	450-470 MC	25 KC	
TRE1111AC	406-420 MC	50 KC	
TRE1112AC	450-470 MC	50 KC	
TRE1111AD	406-420 MC	25 KC	
TRE1112AD	450-470 MC	25 KC	
TRE1112AE	450-470 MC	50 KC	CARRIER & TONE-CODED
TRE1112AF	450-470 MC	25 KC	
TRE1112AG	450-470 MC	50 KC	
TRE1112AH	450-470 MC	25 KC	

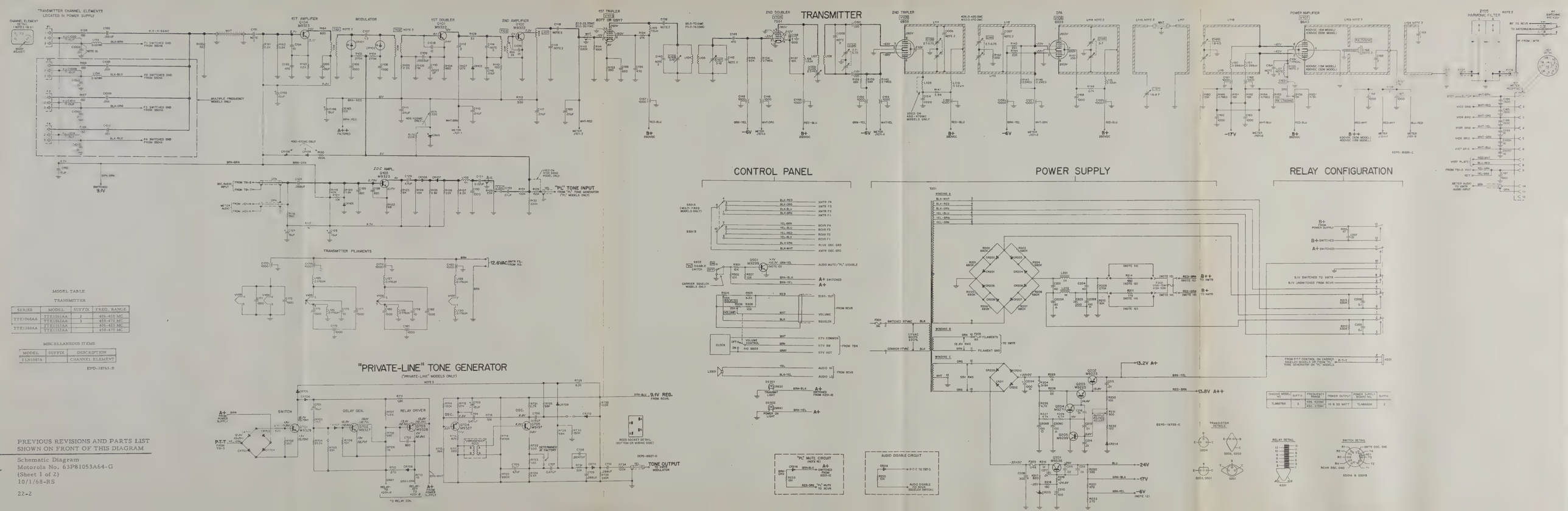
MISCELLANEOUS ITEMS

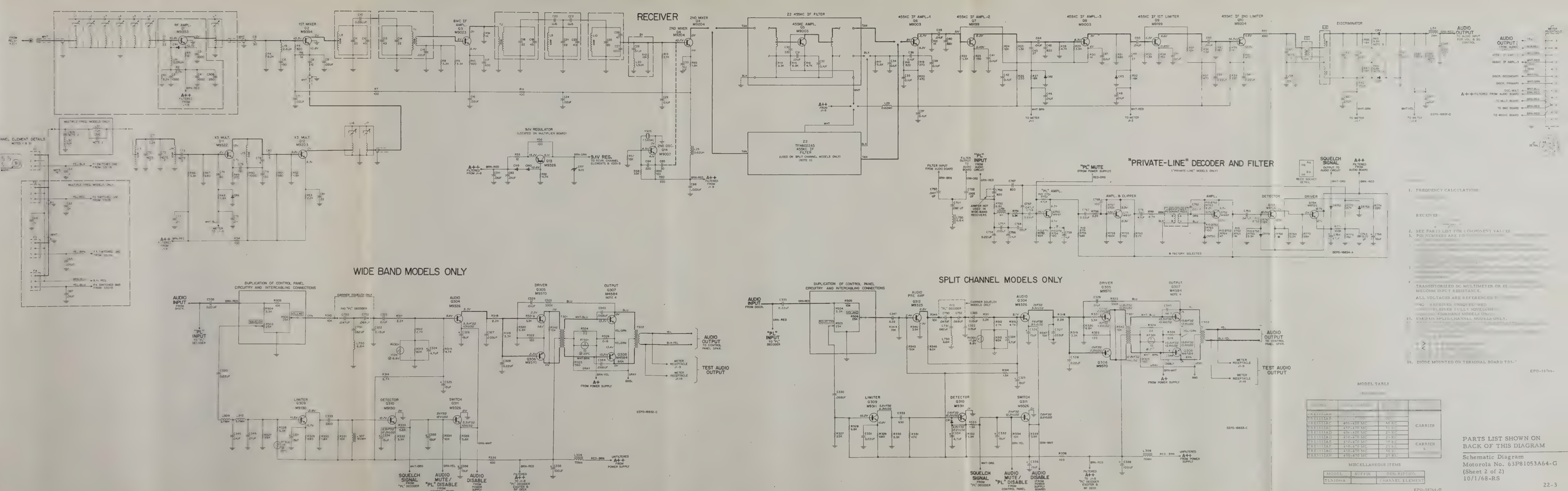
MODEL	SUFFIX	DESCRIPTION
TLN1086A		CHANNEL ELEMENT

EPD-18764-O

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Schematic Diagram
Motorola No. 63P81053A64-G
(Sheet 2 of 2)
10/1/68-RS


TRANSMITTER
CONTROL PANEL
POWER SUPPLY
RELAY CONFIGURATION
"PRIVATE-LINE" TONE GENERATOR
("PRIVATE-LINE" MODELS ONLY)
TRANSMITTER FILAMENTS
"PL" TONE INPUT
TONE OUTPUT
MODEL TABLE
TRANSMITTER
MISCELLANEOUS ITEMS
EPD-18763-B
PREVIOUS REVISIONS AND PARTS LIST SHOWN ON FRONT OF THIS DIAGRAM
Schematic Diagram
Motorola No. 63P81053A64-G
(Sheet 1 of 2)
10/1/68-RS
22-2


RECEIVER
WIDE BAND MODELS ONLY
SPLIT CHANNEL MODELS ONLY
"PRIVATE-LINE" DECODER AND FILTER
"PL" MUTE
SQUELCH SIGNAL
AUDIO OUTPUT
TEST AUDIO OUTPUT
DISCRIMINATOR
DUPLICATION OF CONTROL PANEL CIRCUITRY AND INTERCABLING CONNECTIONS
MODEL TABLE
MISCELLANEOUS ITEMS
PARTS LIST SHOWN ON BACK OF THIS DIAGRAM
Schematic Diagram
Motorola No. 63P81053A64-G
(Sheet 2 of 2)
10/1/68-RS
22-3

RECEIVER

TLE6154A RF Deck (406-420 MC)
TLE6155A RF Deck (450-470 MC) EPD-14197-C

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C1	21D82355B05	22 uuf ±5%; 500 v; N330
C2, 3, 4	21C83191A01	1000 uuf +100-0%; 500 v
C308	21K863801	250 uuf ±10%; 350 v
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1	48B83829D01	germanium: p/o L6
		COIL, RF:
L1	24V80905A31	incl. 24B83767C03 COIL, 3 turn, tapped (TLE6155A)
	or24V80906A18	incl. 24B83767C03 COIL, 3 turn, tapped (TLE6154A)
L2, 3, 4, 5	24V80905A23	incl. 24B83767C01 COIL, 3 turn, (TLE6155A)
	or24V80906A16	incl. 24B83767C01 COIL, 3 turn, (TLE6154A)
L6	24V80905A22	incl. 24B83767C03 COIL, 3 turn, tapped; CR1 (TLE6155A)
	or24V80906A15	incl. 24B83767C03 COIL, 3 turn, tapped (TLE6154A)
L7	24V80905A24	incl. 24B83770C01 COIL, 5-1/2 turn (TLE6155A)
	or24V80906A17	incl. 24B83770C03 COIL, 3 turn, (TLE6154A)
L11	24V80905A25	choke; 0.29 uh
		TRANSISTOR: (SEE NOTE)
Q1	48R869353	P-N-P; type M9353
		RESISTOR, fixed: ±10%; 1/4 w
R1	6S128686	8.2K; ampl.
R2	6S128688	2.7K; ampl.
R3	6S127802	1K; ampl.
NON-REFERENCED ITEMS		
	1V80758A52	ASSY. RF AMPL; incl. C1, C2, C3, C4, L11, Q1, R1, R2, R3, R4
	76B83776C03	CORE, tuning (used with L1, L2, L3, L4, L5, L6)
	1B83244G01	CORE, tuning (used with L7)

TLN8310A Socket & Cable Kit EPD-14198-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C306	21K800801	CAPACITOR, fixed: 1500 uuf GMV; +100%, amp. 500 v
J1	9C857358	CONNECTOR, receptacle: female; 12 contact

TLN8305A Receiver Chassis Kit SPL-139-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
Q307, 308	48S134584	TRANSISTOR (SEE NOTE) P-N-P; coded WHT-GRN
T302	25C82061H02	TRANSFORMER, audio: pri: PINS 1 & 3 with C.T. @ PIN 2 total coil res 0.5 ohms sec: PINS 4 & 5 coil res 0.2 ohms
XQ307, 308	9B851303	SOCKET, transistor: female; 2 contact
NON-REFERENCED ITEM		
		INSULATOR, transistor (used with Q307, 308)

TLN8312A Oscillator Cavity Kit (406-420 MC)
TLN8314A Oscillator Cavity Kit (450-470 MC) EPD-14200-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		COIL, RF:
L16	24B83814C02	injection (406-420 mc)
	or24B83814C01	injection (450-470 mc)
L17	24B82051E05	injection (406-420 mc)
	or24B82051E03	injection (450-470 mc)
NON-REFERENCED ITEMS		
	15D83664C01	HOUSING, oscillator injection
	1V80722A32	ASSY, TOP PLATE
	29B82030E01	LUG, feed-thru (2 req'd.)
	3A824386	SCREW, flat head, 4-40 (2 req'd)

IF Filter EPD-18425-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
Z2	TFN6022AS	bandpass; amplifier circuit board assembly used on split-channel spacing models only

IF Filter EPD-15526-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
Z2	TFN6017AW	bandpass; includes 1V80738A21 Amplifier Circuit Board Assembly (see detail EPD-9433)

TLN8676A Chassis Assembly EPD-18975-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf:
C201, 204	23D83093G06	40 +150-10%; 450 v
C202	23D82125B21	2 section; c/o:
C202A		△ 50 +50-10%; 450 v
C202B		⌓ 100 +50-10%; 450 v
C203	23D83093G07	200 +50-10%; 450 v
C205, 206	8C82095G08	0.1 ±10%; 400 v
C207	21C82164B01	.01 ±10%; 1000 v
C208	23D83093G08	300 +100-10%; 60 v
C209	23D82178B07	3 section; c/o:
C209A		⌓ 1000 +100-10%; 60 v
C209B		□ 100 +100-10%; 60 v
C209C		△ 100 +100-10%; 60 v
C219	21K832502	.02 +60-40%; 250 v
		SEMICONDUCTOR DEVICE, diode: (NOTE)
CR215	48C82392B03	silicon
		LAMP, incandescent: min bay:
DS501, 502	65C82010C03	14 v; 0.31 cp; type No. 756
		FUSE, cartridge: 1-1/4" x 1/4" 250 v:
F201	65S52293	5 a
F202	65S21975	1/2 a
F203	65S20987	1/4 a
F204	65K868957	3/8 a
F205	65S135457	8 a; 125 v; wire-in lead type
		RELAY, armature: special purpose:
K201	80D83252G02	2 section; one section stack type cont assembly, c/o 2 form "A", 4 form "C"; other section coaxial type cont assembly, c/o 1 form "C"; coil res 80 ohms ±10%
		COIL, RF:
L201, 202	25C83253G02	choke: 1 h
		LOUDSPEAKER, magnetic: PM dynamic:
LS501	50D82774C01	oval; 3" x 5"; 3.2 ohms impedance
		TRANSISTOR: (NOTE)
Q201	48R869536	N-P-N; type M9536; incl mounting insulator
Q202, 203	48R869225	N-P-N; type M9225; does not incl 14A83575A01 INSULATOR, mounting
Q501	48R869299	N-P-N; type M9299
		RESISTOR, fixed: ±10%; 1/2 w unl stated
R209	6S6414	270K
R210	17D83122D10	30K ±5%; 6.5 w
R211	17C82381A15	175 ±5%; 15 w
R212, 213	6S2096	330K
R214	17C83390G01	950 ±5%; 40 w
R215	6S5550	47
R225	17C83389G01	15 ±5%; 20 w
R501	6S129225	10K; 1/4 w
R502	6S129230	12K; 1/4 w
R503	6S5581	3.3K
R504	18D82700D07	variable: 25K ±30%; 0.16 w
R505	6S6320	10K
R506	18D82810C07	variable: 25K ±30%; 0.33 w; incl spst switch (S503)
R507	6S6394	12K

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
T201	25D83299G01	TRANSFORMER, power: 117 V AC; 60 cps: pri: BLK, BLK; res 0.85 ohms ±10% high voltage sec: BLK-WHT, BLU with the following taps: BLK-RED, BLK-GRN, YEL-BLU, YEL-BRN, YEL-GRN: total res 30 ohms ±10% low voltage sec: ORG, ORG with WHT center tap; total res 0.7 ohms ±10% filament winding: GRN, GRN; res .09 ohm ±10%
XDS501, 502	9B82778C01	LAMPHOLDER: min bay; does not incl lens (see NON-REFERENCED ITEMS)
XF201, 202	9C82083C01	FUSEHOLDER: extractor post type
NON-REFERENCED ITEMS		
	36B82629H01	KNOB, control: 2 req'd (VOL & SQ)
	55B83660E02	LOCK: incl 55K893872 KEY: 2 supplied

TLN8622A "Private-Line" Kit EPD-18978-B

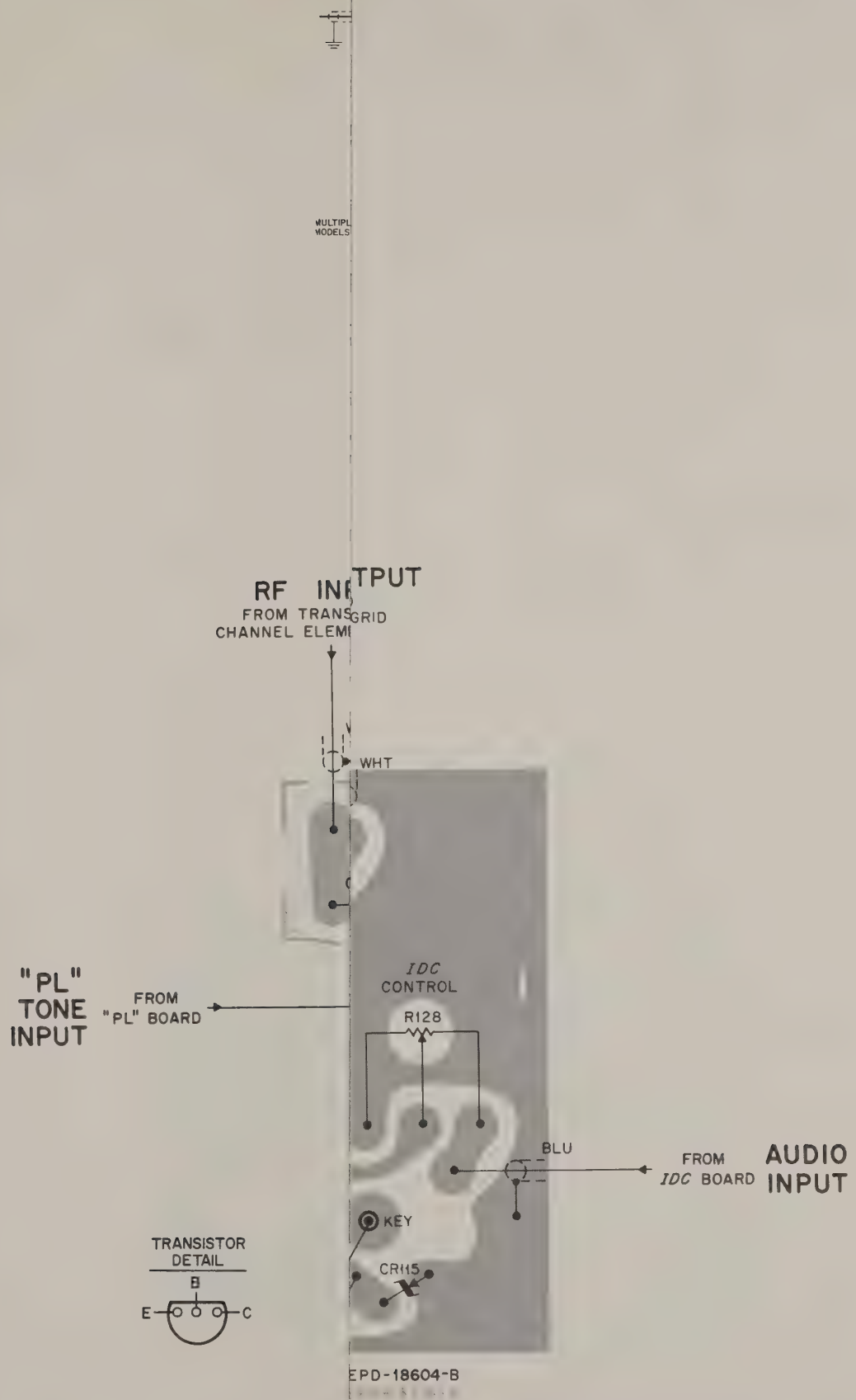
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C751	8D82905G45	CAPACITOR, fixed: .082 uf ±10%; 50 v NOTE This component is installed at the factory on TLN8558A "PL" Decoder Board
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR217	48B82533D10	zener type
		RESISTOR, fixed:
R234	6R6432	270 ±10%; 1/2 w
		SWITCH, level: "pile-up" type:
S502	40C83303G01	2 position, locking; spst; does not incl 64D83071G07 ESCUTCHEON

TLN8619A Multiple-Frequency Kit EPD-18979-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
S501	40C83304G01	SWITCH, rotary: 2 pole; 4 position; incl adjustable stop; does not incl 36B82630H01 KNOB, control

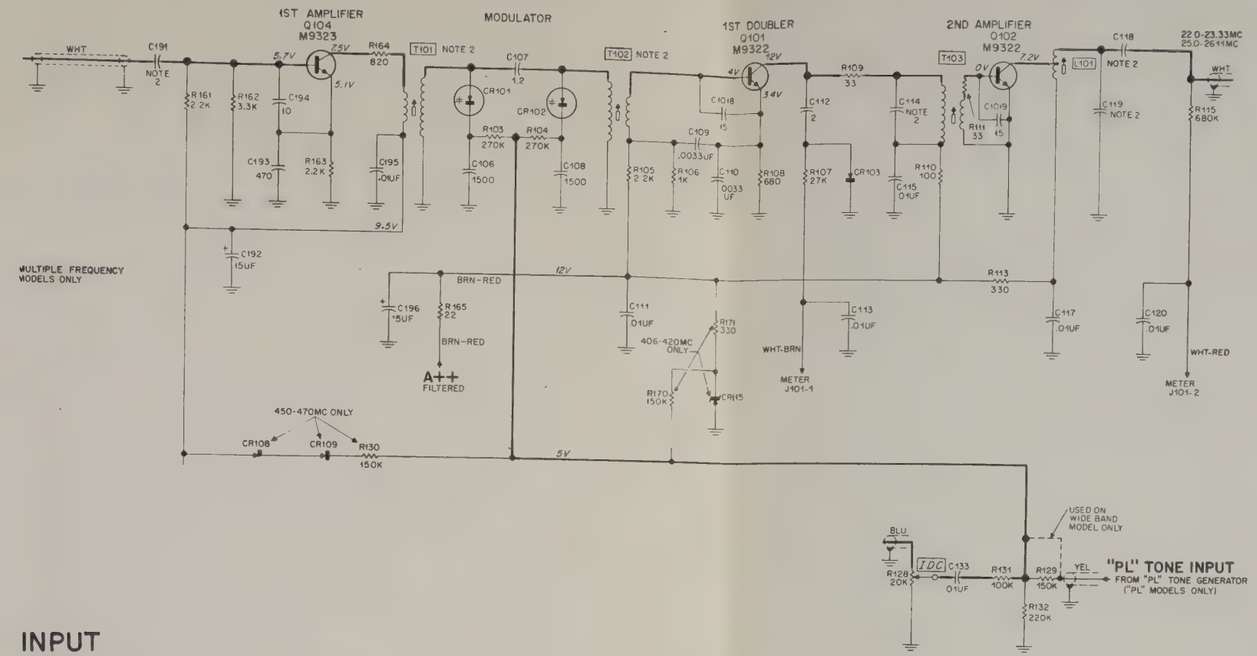
NOTE:

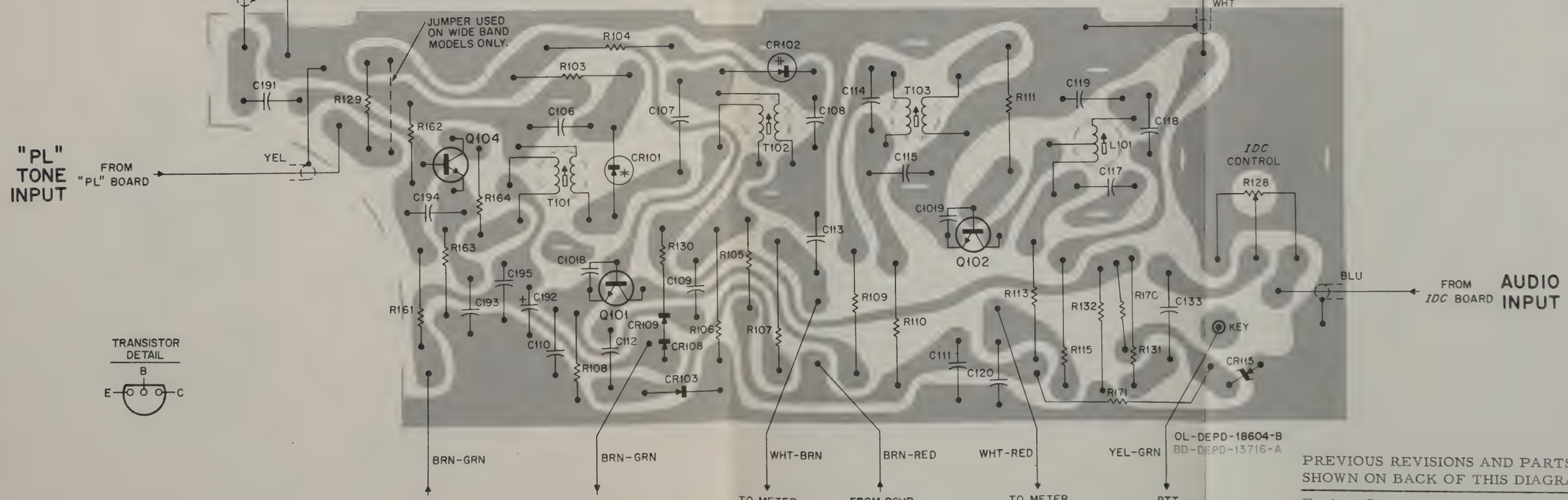
Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.



PREVIOUS REVISIONS AND PARTS LIST
SHOWN ON BACK OF THIS DIAGRAM

Exciter Circuit Board Detail
Motorola No. PEPD-18603-A1
10/1/68-RS





OL-DEPD-18604-B
BD-DEPD-13716-A

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Exciter Circuit Board Detail
Motorola No. PEPD-18603-A1
10/1/68-RS

REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A			REVISED DESIGNATION OF BRN-RED (A+) LEAD.	BOTTOM CENTER OF BOARD.

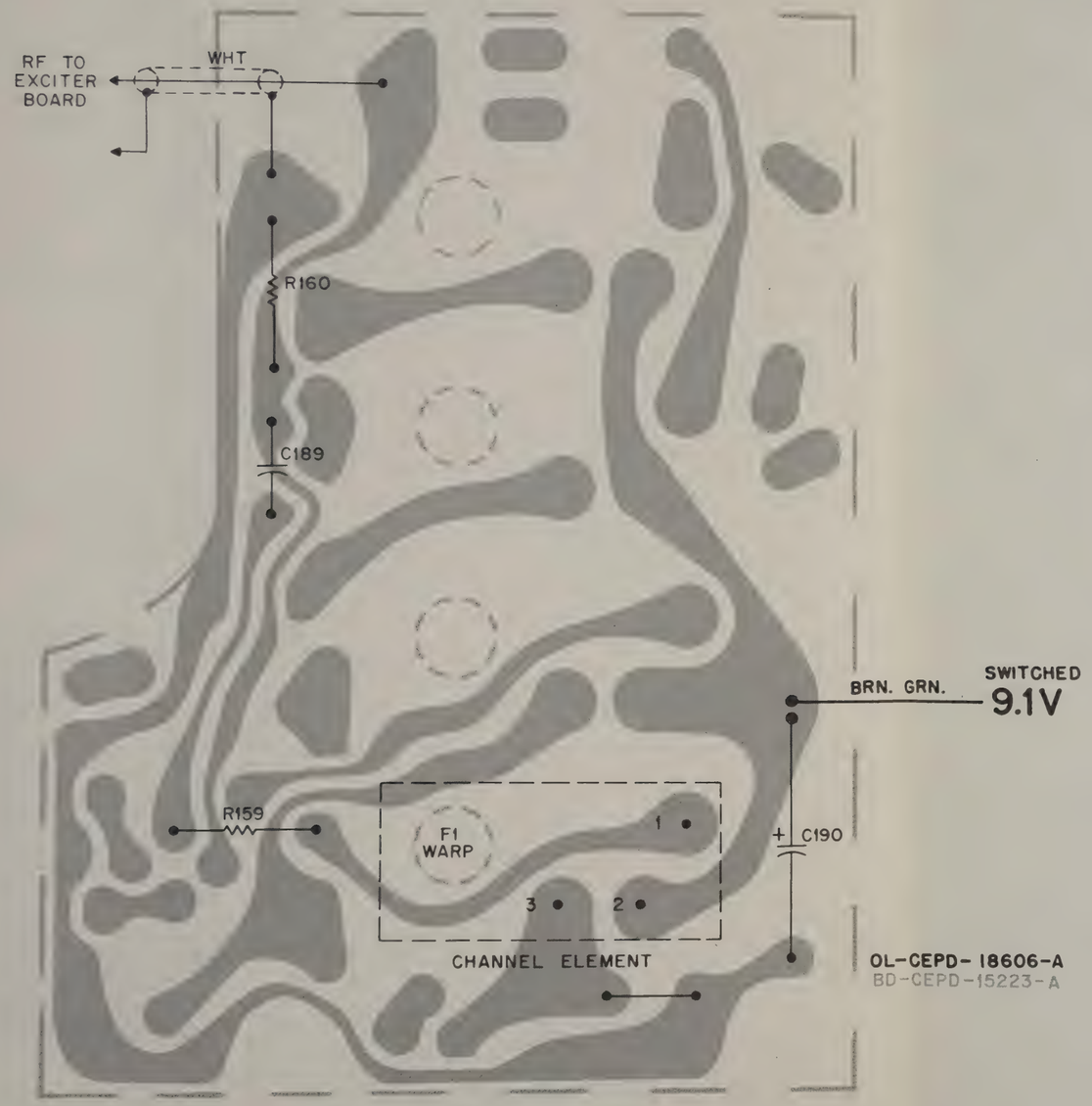
PARTS LIST

TLE6156A Exciter Kit (406-420 MC)
TLE6157A Exciter Kit (450-470 MC) EPD-15273-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uuf; ±10%; 500 v; unl. stated
C106, 108	21D82187B18	1500; 1000 v
C107	21C82450B08	1.2 ±5%
C109, 110	21D82428B10	.0033 uf; 100 v
C111, 120	21D82428B58	.01 uf +80-20%
C112	21D82133G37	2 ±0.25 uuf; NP0
C113, 115, 117, 195	21D82428B59	.01 uf +80-20%; 200 v
C114	21D82610C44	100 ±5%; 100 v; N220 (TLE6157A)
	or21D82610C09	120 ±5%; N220 (TLE6156A)
C118, 191	21D82187B10	270 (TLE6157A)
	or21C82428B59	.01 uf +80-20%; 200 v (TLE6156A)
C119	21D82133G81	10; N1500 (TLE6157A)
	or21D82204B19	20 ±5%; N1500 (TLE6156A)
C133	8D82905G07	0.1 uf; 50 v
C192	23K865136	15 uf ±20%; 25 v
C193	21C82187B07	470
C194	21D82133G01	10 ±5%; NP0
C1018, 1019	21K840846	15 ±5%; NP0
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR101, 102	48C82190H02	silicon; varactor type
CR103	48C82921G01	germanium
CR108, 109	48C82392B03	silicon (TLN6157A only)
CR115	48D82256C56	silicon; zener type (TLN6156A only)
		COIL, RF:
L101	24V80905A27	RED DOT; incl. 76C82098H01 CORE, tuning
		TRANSISTOR: (SEE NOTE)
Q101, 102	48R869322	N-P-N; type M9322
Q104	48R869323	N-P-N; type M9323
		RESISTOR ±5%; 1/2 w; unl. stated
R103, 104	6S2050	270K
R105, 161, 163	6S128689	2.2K ±10%; 1/4 w
R106	6S6229	1K ±10%
R107	6S5786	27K
R108	6S128599	680 ±10%; 1/4 w
R109, 111	6S2036	33 ±10%
R110	6S6326	100 ±10%
R113	6S6022	330 ±10%
R115	6S5775	680K
R128	18D82238D14	var; 20K; 1/4 w
R129	6S128683	150K; 1/4 w
R130	6S5559	150K (TLN6157A only)
R131	6S5553	100K
R132	6S400066	220K
R162	6S129231	3.3K ±10%; 1/4 w
R164	6S129432	820 ±10%; 1/4 w
R170	6S128683	150K; 1/4 w (TLE6156A only)
R171	6S129806	330; 1/4 w (TLE6156A only)
		TRANSFORMER:
T101, 102	24V80903A21	coded GRAY-ORG incl. 76B82611C02 CORE, tuning; (TLE6157A)
	or24V80903A26	coded ORG-RED incl. 76B82611C02 CORE, tuning; (TLE6156A)
T103	24V80905A26	GRN DOT; incl. 76C82098H01 CORE, tuning
NON-REFERENCED ITEMS		
	1V80737A35	SHIELD ASSY. (Used with T101, T102)
	26A82076C03	SHIELD (Used with L101, T103)

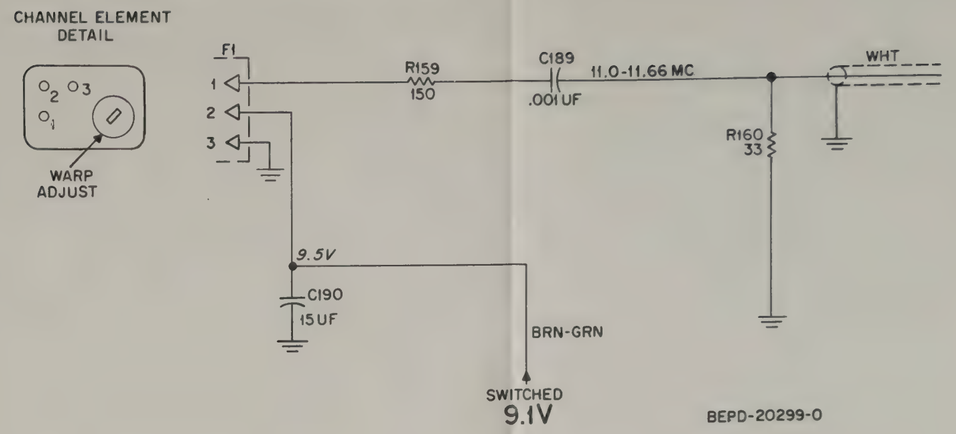
NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.



OL-CEPD- 18606-A
BD-CEPD-15223-A

TRANSMITTER CHANNEL ELEMENTS



BEPD-20299-0

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Transmitter Channel Element
(Single-Frequency Models)
Circuit Board Detail
Motorola No. PEPD-18605-A
10/1/68-RS

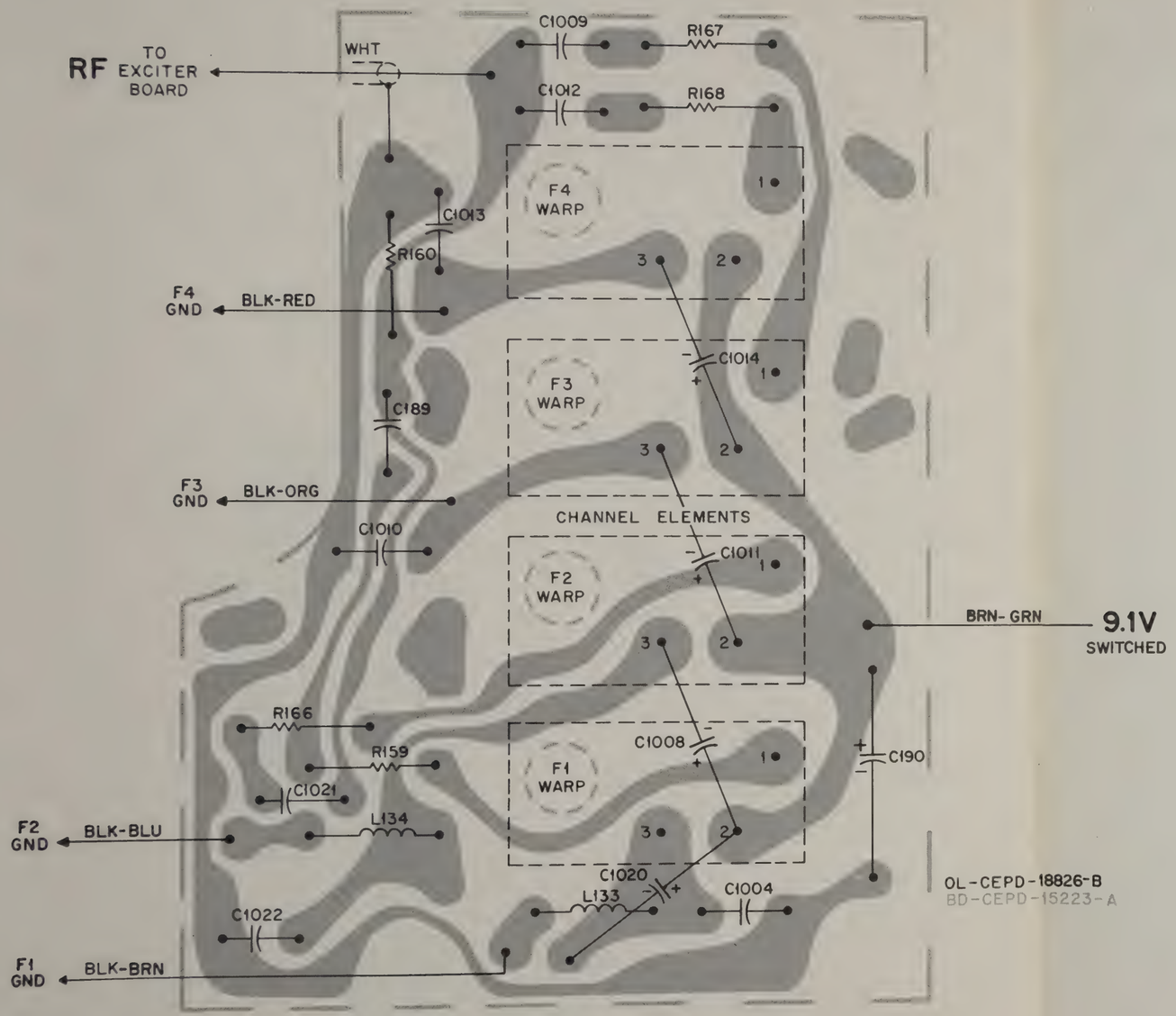
REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN8437A		VARIOUS CIRCUIT & COMPONENT CHANGES AT START OF PRODUCTION.	

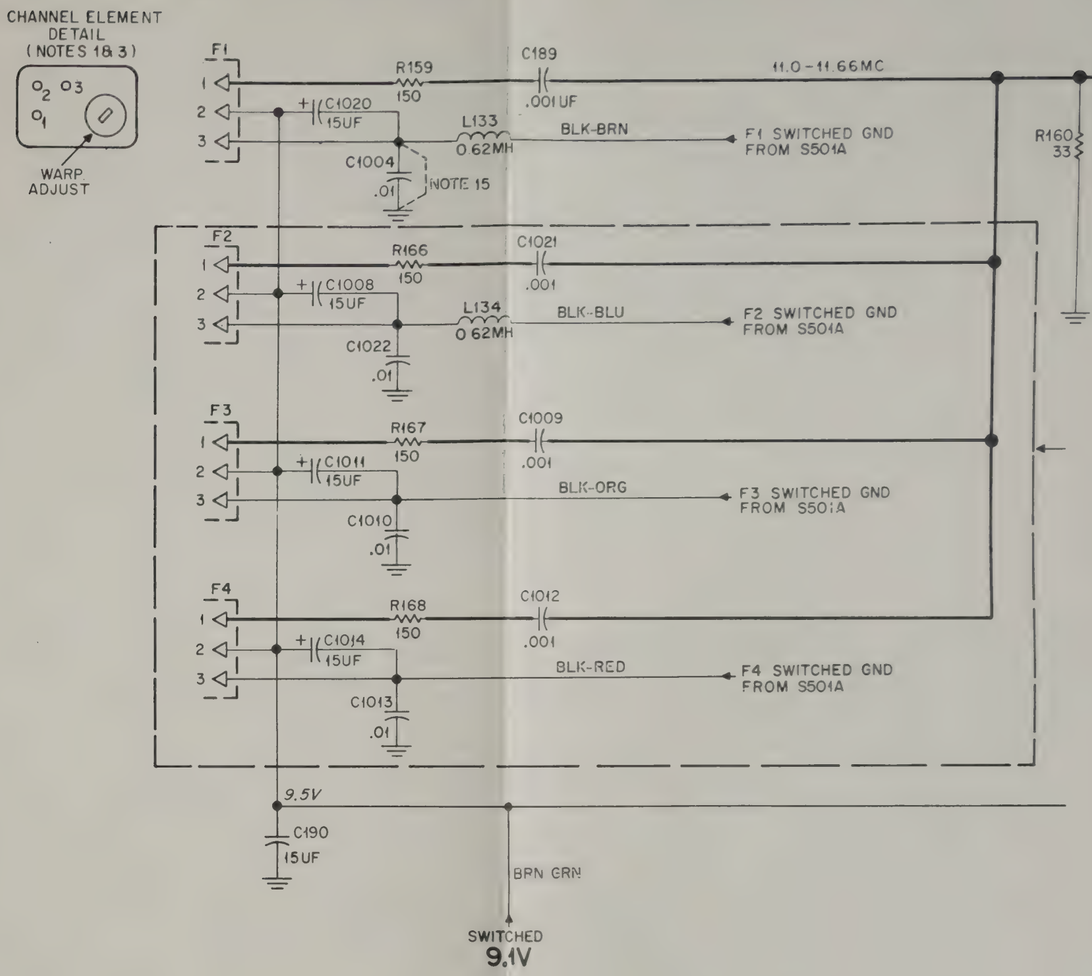
PARTS LIST

TLN8437A Channel Element Board Kit EPD-15276-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C189	21C82187B20	.001 uf ±10%; 100 v
C190	23K865136	15 uf ±20%; 25 v
		RESISTOR, fixed:
R159	6S129862	150 ±10%; 1/4 w
R160	6S129754	33 ±10%; 1/4 w



TRANSMITTER CHANNEL ELEMENTS
LOCATED IN POWER SUPPLY



REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Transmitter Channel Element
(Multi-Frequency Models)
Circuit Board Detail
Motorola No. PEPD-18827-B
10/1/68-RS

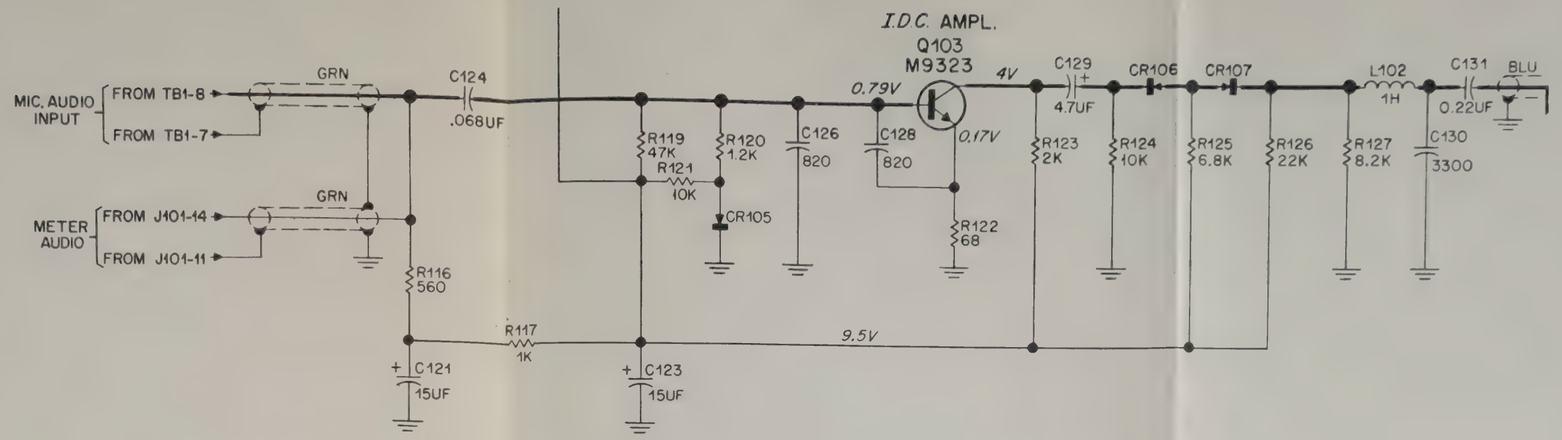
REVISIONS

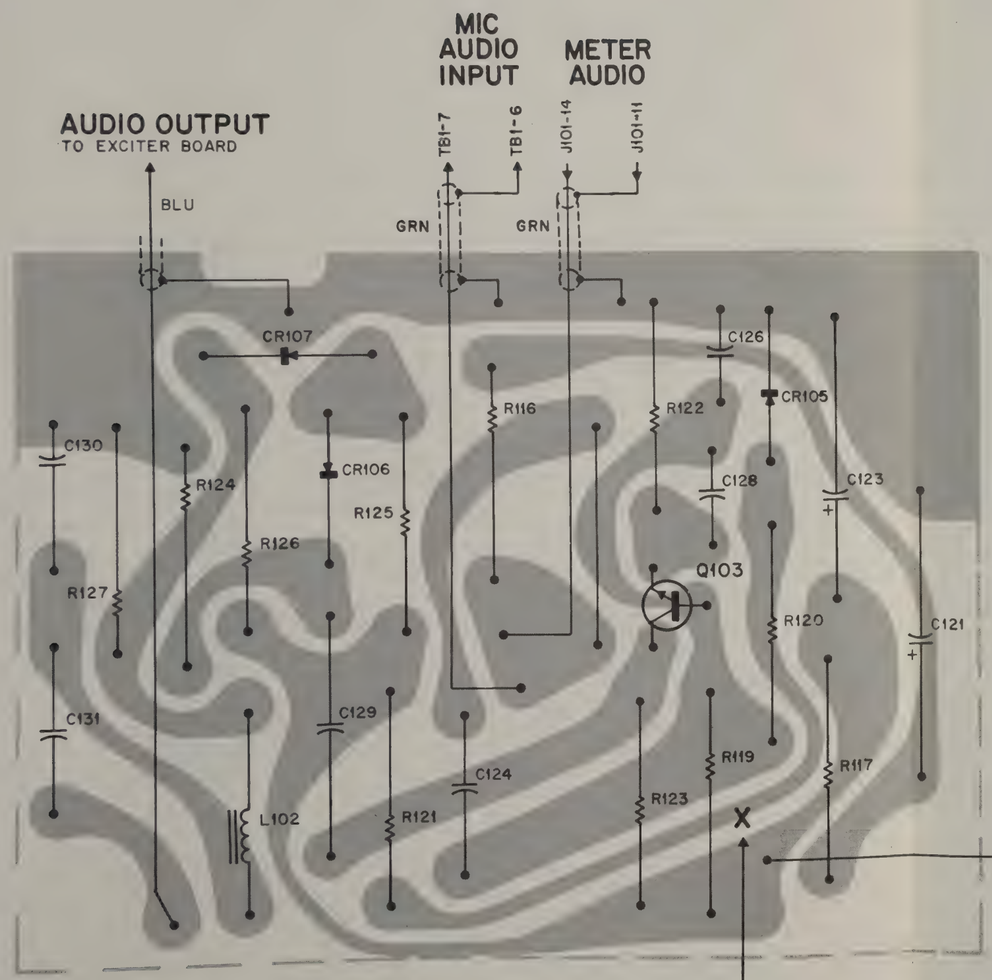
DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN8530A		VARIOUS CIRCUIT CHANGES AT START OF PRODUCTION.	
B		C1020	WAS C1005	SCHEM. & PARTS LIST
		C1021	WAS C1006	
		C1022	WAS C1007	

PARTS LIST

TLN8530A Xmtr. Channel Element Board
(Multiple Frequency) EPD-15556-D

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C189, 1021, 1009, 1012	21C82187B20	.001 uf ±10%; 100 v
C190 1020, 1008, 1011, 1014	23K865136	15 uf ±20%; 25 v
C1004, 1022 1010, 1013	21D82428B59	.01 uf +80-20%; 200 v
		COIL, RF:
L133, 134	24V80900A61	choke; 0.62 mh; sleeved
		RESISTOR, fixed: ±10%;
R159, 166, 167, 168	6S129862	150; 1/4 w
R160	6S129754	33; 1/4 w





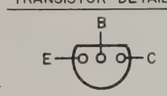
OL-CEPD-18608-A
8D-CEPD-13719-A

0	
A	TRANSISTOR DETAIL ADDED 8/19/68

MODEL TABLE

MODEL	SUFFIX	DESCRIPTION
TLN8317A		"IDC" BOARD

TRANSISTOR DETAIL



MOTOROLA INC.	CHICAGO 51, ILLINOIS, U. S. A.
ENGINEERING PROJECT NO.	
PART NUMBER	CEPD-13719

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

"IDC" Circuit Board Detail
Motorola No. PEPD-18607-O1
10/1/68-RS

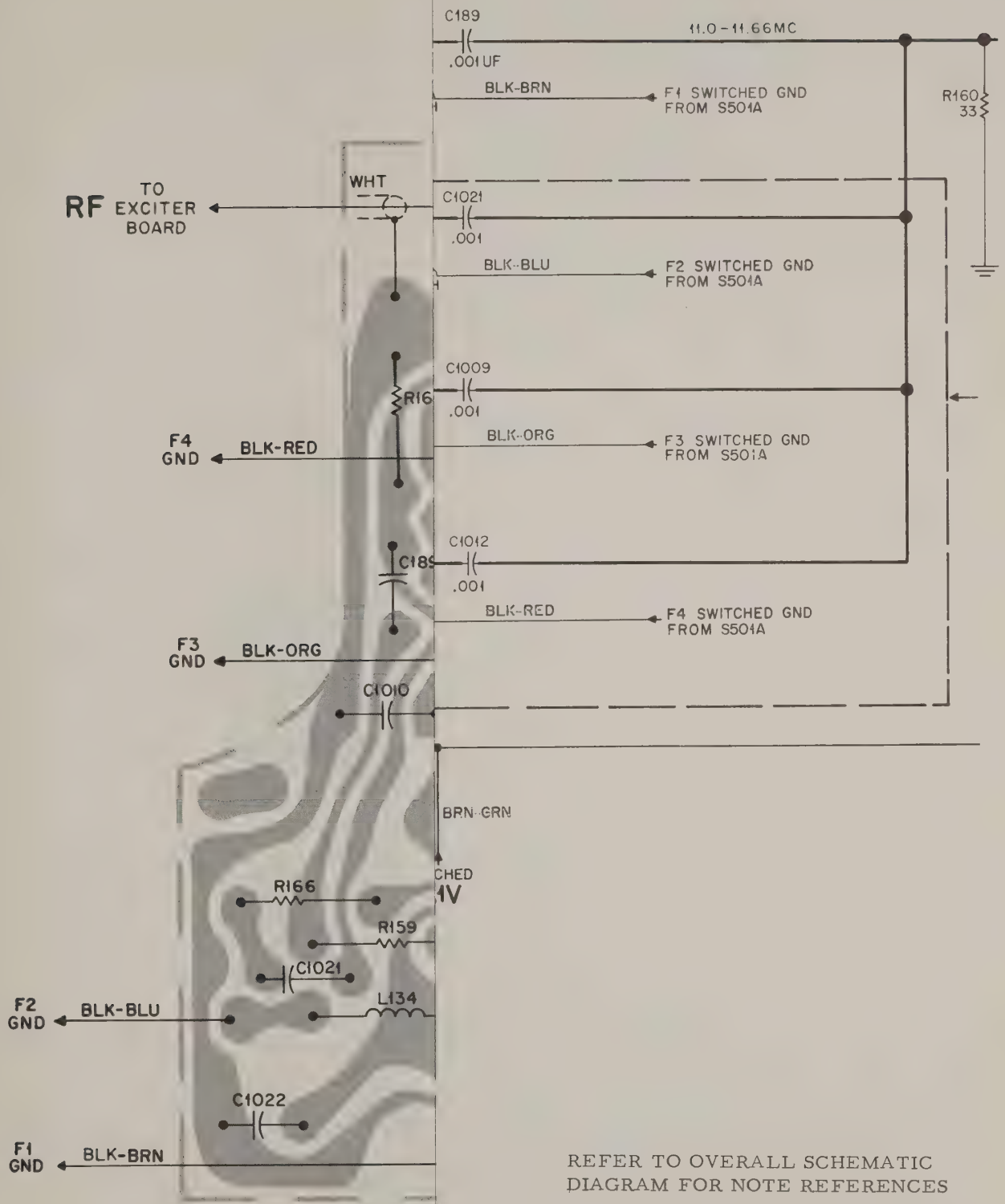
PARTS LIST

T1LN8317A I.D.C. Board Kit EPD-15275-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf ±10%; 25 v; unl. stated
C121, 123	23K865136	15 ±20%
C124	8D82905G04	.068; 50 v
C126, 128	21D82187B17	820 uuf; 500 v
C129	23K865137	4.7 ±20%
C130	8D82905G25	.0033; 100 v
C131	8D82905G11	0.22; 50 v
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR105, 106, 107	48C82392B03	silicon
		COIL, audio:
L102	25D82113H02	choke; 1 h
		TRANSISTOR: (SEE NOTE)
Q103	48R869323	N-P-N; type M9323
		RESISTOR, fixed: ±5%; 1/2 w; unl. stated
R116	6S6291	560 ±10%
R117	6S6229	1K ±10%
R119	6S5772	47K
R120	6S6166	1.2K
R121, 124	6S5556	10K
R122	6S400424	68
R123	6S400060	2K
R125	6S2001	6.8K
R126	6S6480	22K
R127	6S400490	8.2K

NOTE:

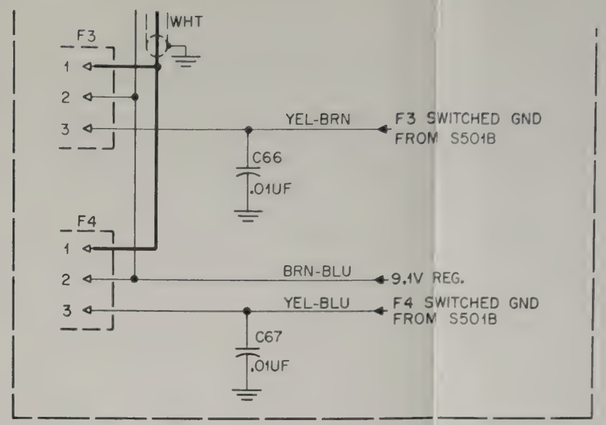
Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

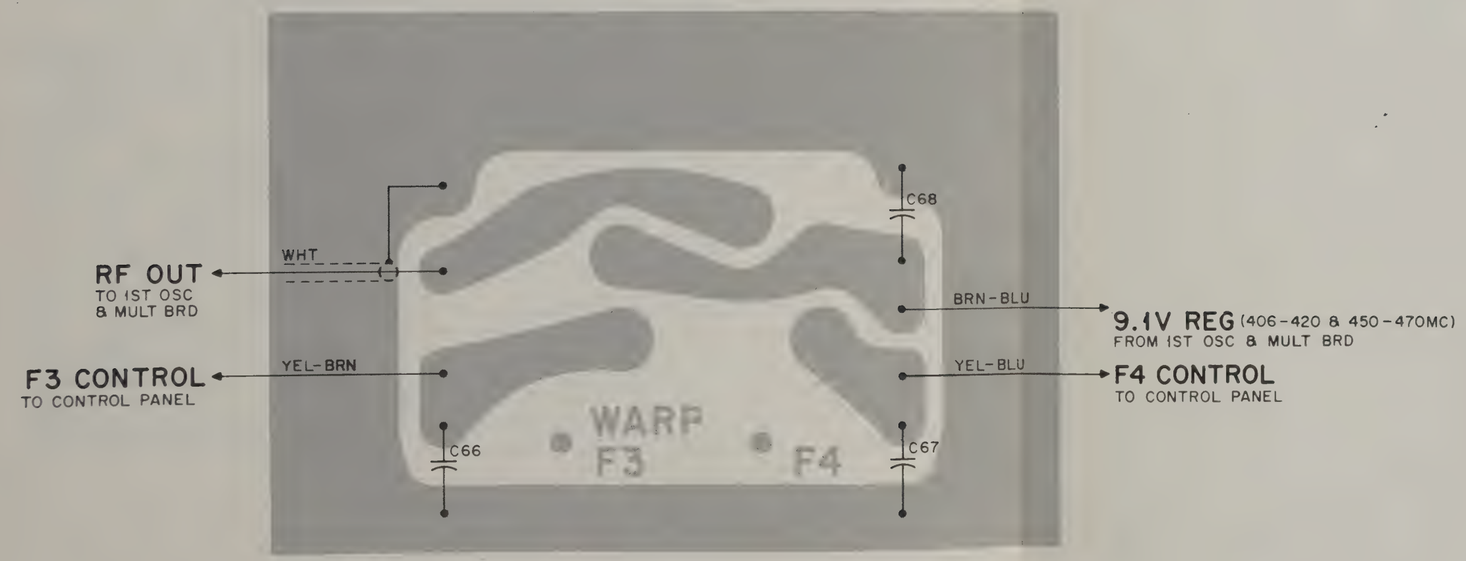


REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Transmitter Channel Element
(Multi-Frequency Models)
Circuit Board Detail
Motorola No. PEPD-18827-B
10/1/68-RS





BD CEPD-18754-O

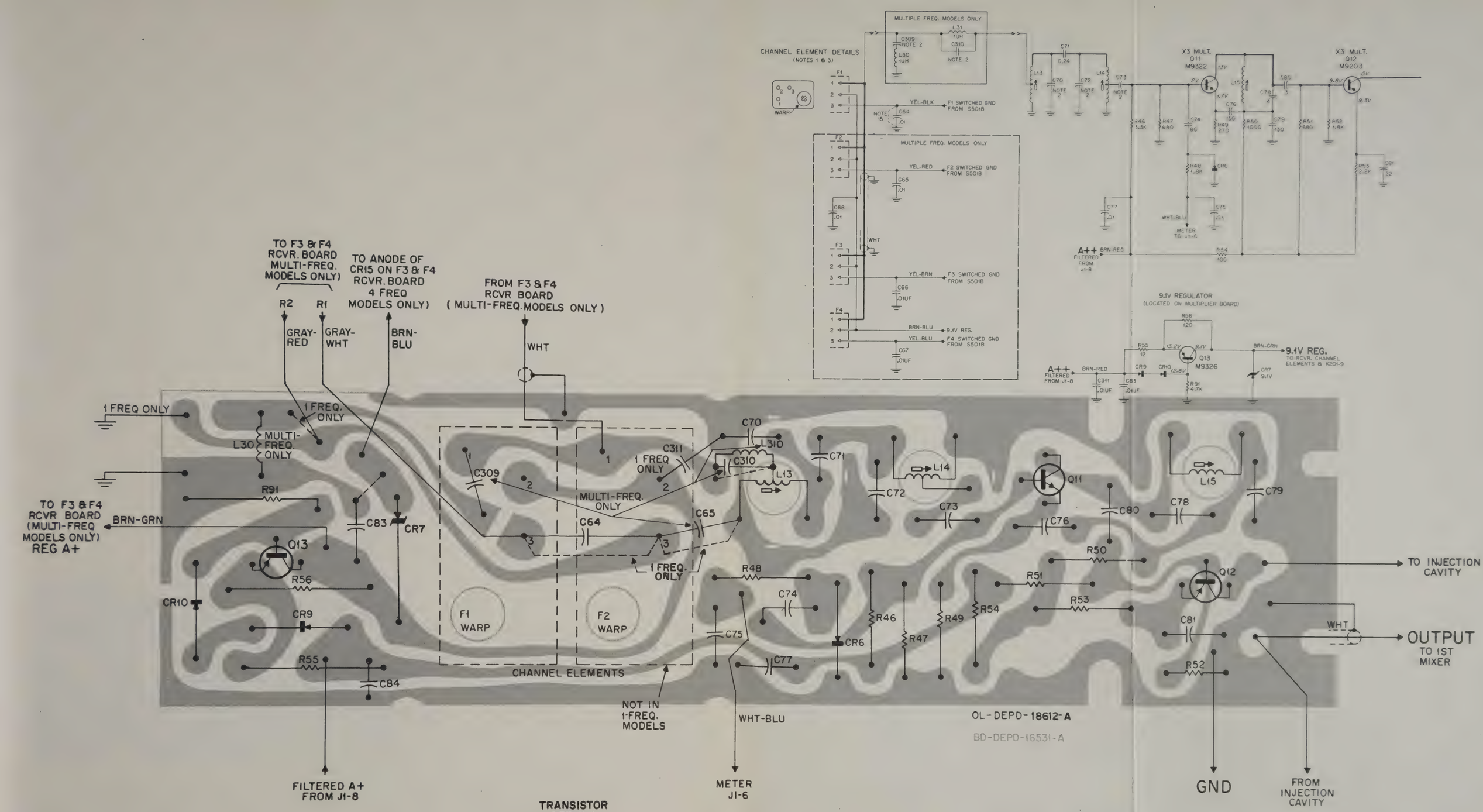
OL CEPD-18835-A

PARTS LIST

1V80777A93 Channel Element Board
(P/O TLN8619A) EPD-18927-O

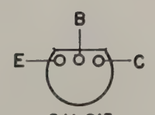
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C66, 67, 68	21D82428B59	CAPACITOR, fixed: .01 uf ±20%; 200 v

Receiver F3 & F4 Channel
Element Circuit Board Detail
Motorola No. PEPD-18836-O1
10/1/68-RS



TRANSISTOR DETAILS

E = EMITTER
B = BASE
C = COLLECTOR



Q11, Q13

Q12

MODEL	SUFFIX
TLN8311A	
TLN8313A	2
TLN8541A	2

EPS-967-O

REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

1st Oscillator & Multiplier
Circuit Board Detail
Motorola No. PEPD-18611-A1
10/1/68-RS

REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A			ADDED MODEL & SUFFIX TABLE	

PARTS LIST

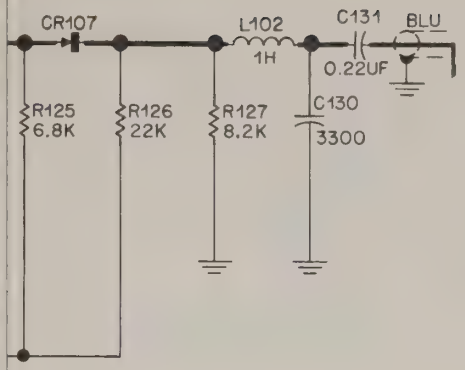
TLN8311A Oscillator Kit
(Multiple-Frequency Operation) 406-420 MC
TLN8313A Oscillator Kit
(Single-Frequency Operation) 450-470 MC
TLN8541A Oscillator Kit
(Multiple-Frequency Operation) 450-470 MC

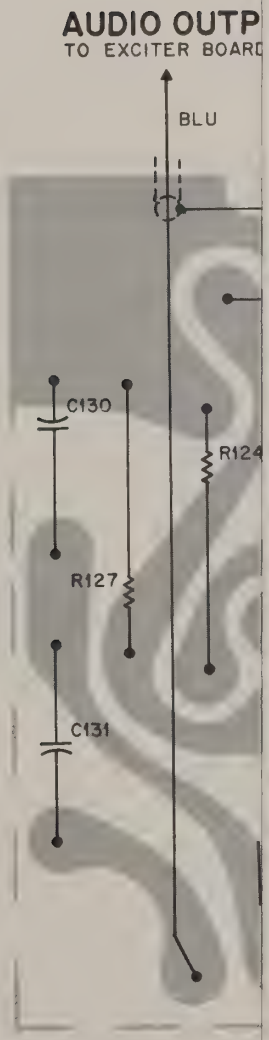
EPD-14203-D

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uuf; ±5%; 500 v; unl stated
C64, 65, 75, 77, 83	21C82428B59	.01 uf +80-20%; 200 v
C70, 72	21K840845	24; N220 (TLN8313A, TLN8541A)
	or21K849335	30; N150 (TLN8311A)
C71	21D82450B05	0.24 ±10%; NP0
C73	21D82610C03	47; 200 v; N220 (TLN8313A & TLN8541A only)
	or21D82610C47	57; 100 v; N220 (TLN8311A only)
C74	21D82133G09	80; N750
C76	21D863147	150 ±10%; 400 v
C78	21D82133G11	4 ±0.5 uuf; NP0 (TLN8313A, TLN8541A)
	or21K849333	6 .25 uuf; N330 (TLN8311A)
C79	21D82610C28	130; 200 v; N470
C80	21K868935	3 ±0.25 uuf; 2000 v; N750
C81	21D82133G20	22 ±5%; N330
C84	21D82187B29	1000 ±10%; 100 v (TLN8311A only)
C309	21K831125	100 ±10%; 300 v (TLN8541A only)
	or21D82610C27	120; 200 v; N470 (TLN8311A only)
C310	21K861436	100 ±10%; 75 v (TLN8541A only)
	or21D82877B41	120 ±10%; 75 v; N750 (TLN8311A only)
C311	21K832501	.01 uf +60-40%; 250 v
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR6	48C82921G02	germanium
CR7	48D82256C43	silicon; zener type (single-frequency)
	or48D82256C56	silicon; zener type (multi-frequency)
CR9, 10	48C82392B05	silicon
		COIL, RF:
L13	24V80906A29	incl. ref. parts C310, L31 and 76B82098H01 CORE, tuning
L14	24V80905A64	incl. 24B83868D01 COIL, tapped 76B82098H01 CORE, tuning
L15	24V80905A19	incl. 24B83670C01 COIL, 4-3/4 turns; 76B82098H01 CORE, tuning
L30, 31	24B864019	choke; 1 uh
		TRANSISTOR: (SEE NOTE)
Q11	48R869322	N-P-N; type M9322
Q12	48R869203	P-N-P; type M9203
Q13	48R869326	P-N-P; type M9326
		RESISTOR, fixed: ±10%; 1/4 w unl stated
R46	6S129231	3.3K
R47, 51	6S128599	680
R48, 52	6S129269	1.8K
R49	6S129752	270
R50	6S127801	470
R53	6S128689	2.2K
R54	6S129753	100
R55	6S114262	12 ±5%; 1/2 w
R56	6S5551	120; 1/2 w
R91	6S6080	4.7K; 1/2 w
NON-REFERENCED ITEM		
	26A82076C01	SHIELD, coil (used with L13, L14, L15)

NOTE:

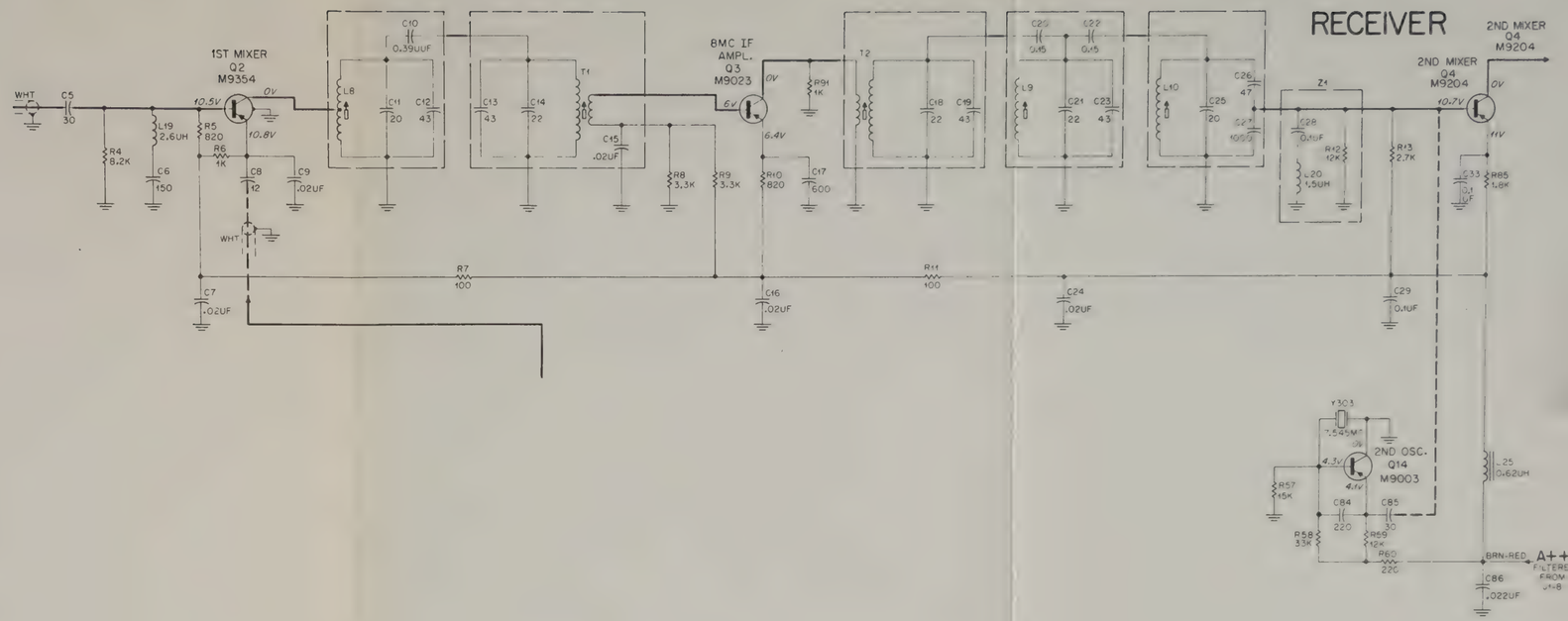
Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

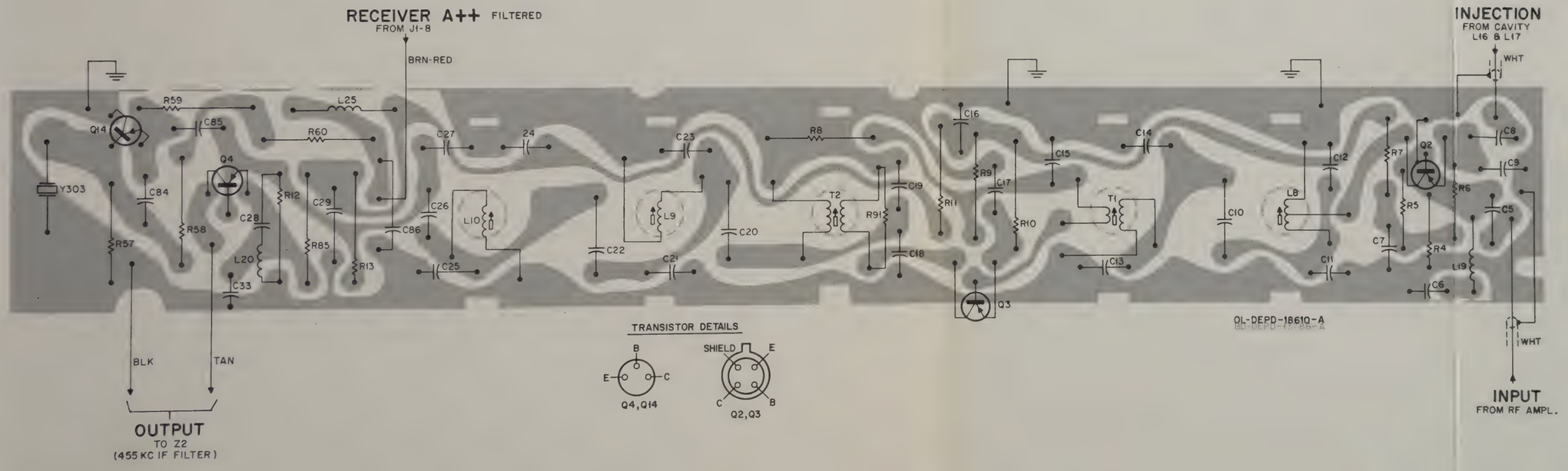




PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

"IDC" Circuit Board Detail
Motorola No. PEPD-18607-01
10/1/68-RS





PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

8 MC IF & 2nd Oscillator
Circuit Board Detail
Motorola No. PEPD-18609-01
10/1/68-RS

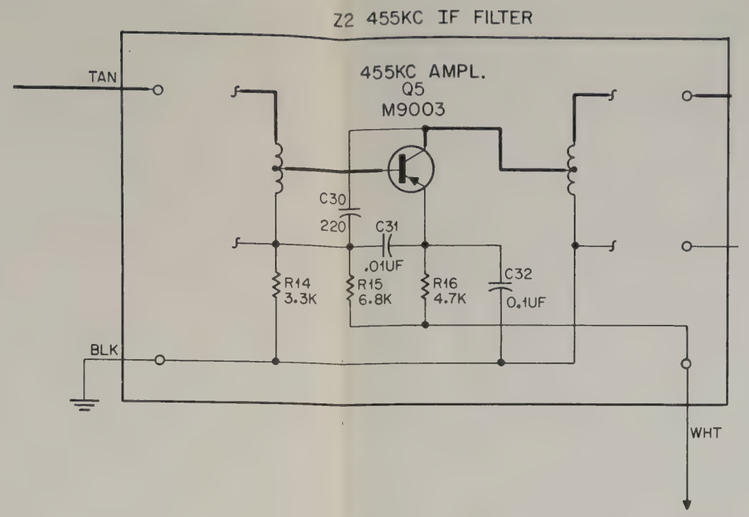
PARTS LIST

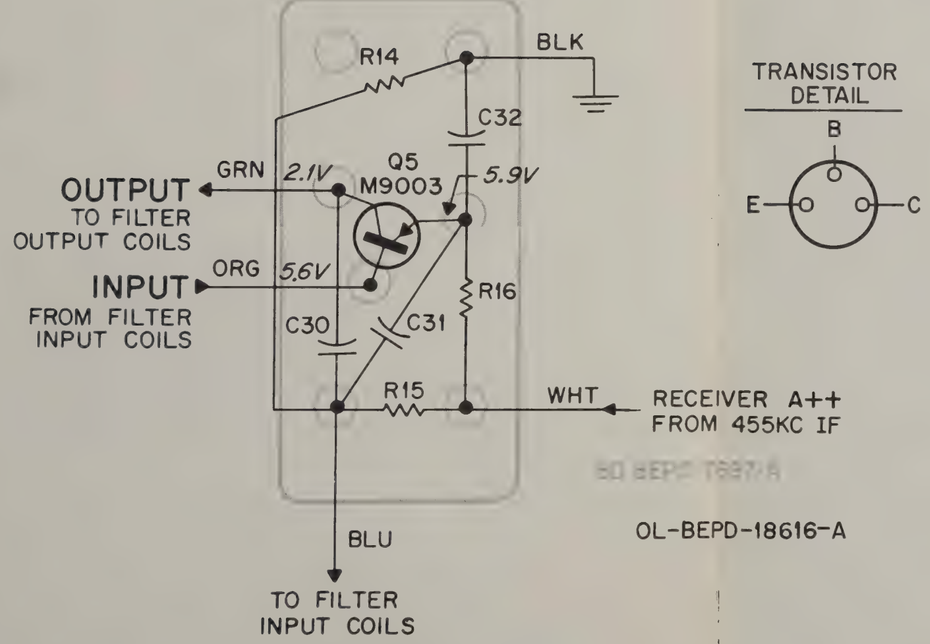
TLN8307A 8 MC IF & 2nd Oscillator
TLN8307AH 8 MC IF & 2nd Oscillator EPD-14205-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uuf ±5%; 500 v; unl. stated
C5	21D82133G59	30; N330
C6	21D82187B32	150 ±10%
C7, 9, 15, 16, 24	21D82428B18	.02 uf +60-40; 100 v
C8	21D82133G02	12; NP0
C10	21C82450B07	0.39
C11, 25	21D82133G24	20; N330
C12, 13, 19, 23	21D82537B07	43
C14, 18, 21	21D82133G20	22; N330
C17	21D82428B34	600 ±10%; 600 v
C20, 22	21K881064	0.15
C26	21K868681	47
C27	21D82537B16	1000; 100 v
C28	21D82372C02	0.1 uf +80-20%; 25 v (p/o Z1)
C29, 33	8C82095G06	0.1 uf ±10%; 200 v
C84	21K859942	220
C85	21D82133G17	30; N1500
C86	8D82905G02	.022 uf ±10%; 50 v
		COIL, RF:
L8	24V80905A18	incl. 24C823781C01 COIL, 22 total turns; tapped @ 12 turns; 76B82888D02 CORE, tuning
L9, 10	24V80905A15	incl. 24C82073G09 COIL 22 turn; 76B82888D02 CORE, tuning; coded BLK-GRAY
L19	24C82835G03	choke; 2.6 uh
L20	24C82835G02	choke; 1.5 uh (p/o Z1)
L25	24D82135G08	choke; 0.62 uh
		TRANSISTOR: (SEE NOTE)
Q2	48R869354	P-N-P; type M9354
Q3	48R869023	P-N-P; type M9023
Q4	48R869204	P-N-P; type M9204
Q14	48R869003	P-N-P; type M9003
		RESISTOR, fixed: ±10%; 1/2 w unl. stated
R4	6S128686	8.2K; 1/4 w
R5	6S129432	820; 1/4 w
R6, 91	6S127802	1K; 1/4 w
R7	6S129753	100; 1/4 w
R8, 9	6S5581	3.3K
R10	6S6269	820
R11	6S6326	100
R12	6R6394	12K (p/o Z1)
R13	6S5577	2.7K
R57	6S5726	15K ±5%
R58	6S6410	33K
R59	6S6394	12K
R60	6S6270	220
R85	6S2089	1.8K
		TRANSFORMER:
T1	24V80905A16	incl. 24C82073G10 COIL, 22 turn; 76B82888D02 CORE, tuning; coded BRN-GRAY
T2	24V80905A17	incl. 24C82073G11 CORE, 22 turn; 76B82888D02 CORE tuning; coded GRN-GRAY
		CRYSTAL UNIT, quartz:
Y303	G11 or G09	7.545 mc (TLN8307A) 8.455 mc (TLN8307AH)
		NETWORK:
Z1	1V80741A58	incl. C28, L20, R12
NON-REFERENCED ITEM		
	26K858660	SHIELD, coil (used with L8, L9, L10, T1, T2)

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.





OL-BEPD-18616-A

IMPORTANT

A++FILTER COMPONENTS ARE NOT SHOWN ON PARTIAL SCHEMATIC. REFER TO A++ DISTRIBUTION DETAIL ON THE RADIO SET SCHEMATIC DIAGRAM.

PARTS LIST

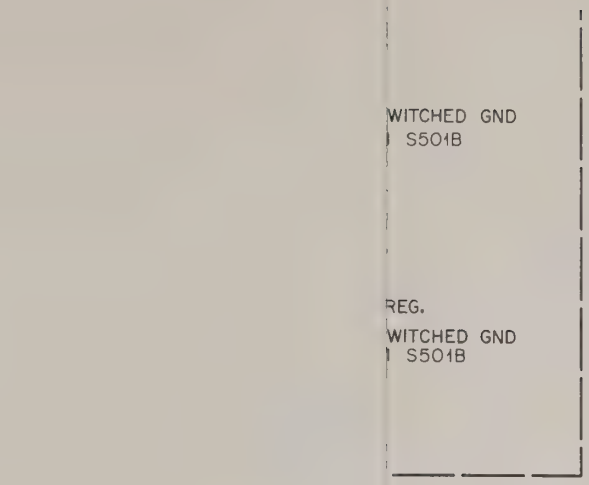
1V80738A21 455 KC Filter Amplifier Board EPD-18226-O

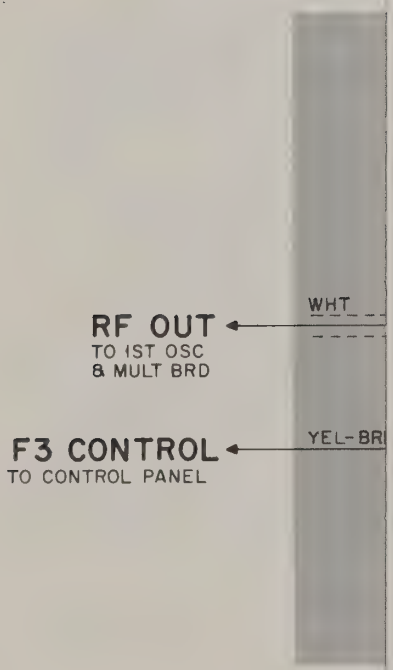
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C30	21D82428B20	220 uuf ±20%; 100 v
C31	21D82428B19	.01 uf ±20%; 100 v
C32	21C82372C01	0.1 uf +80-20%; 25 v
		TRANSISTOR: (SEE NOTE)
Q5	48R869003	P-N-P; type M9003
		RESISTOR, fixed: ±10%; 1/4 w unl stated
R14	6K129231	3.3K
R15	6K128687	6.8K
R16	6K127804	4.7K
NON-REFERENCED ITEM		
	1V80721A78	CIRCUIT BOARD ASSEMBLY (eyeleted)

NOTE:

Replacement transistors must be ordered by Motorola part number only for optimum performance.

455 KC Filter Amplifier (Wideband)
Circuit Board Detail
Motorola No. PEPD-18615-O1
10/1/68-RS





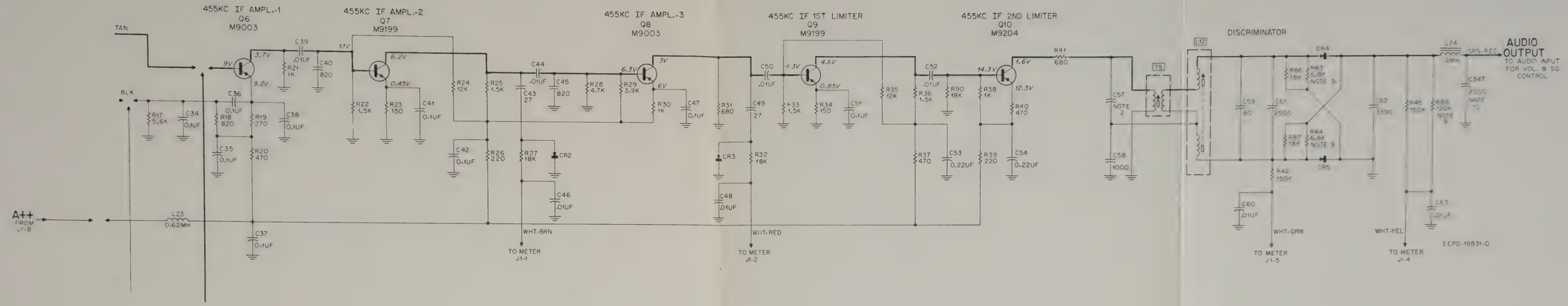
PARTS LIST

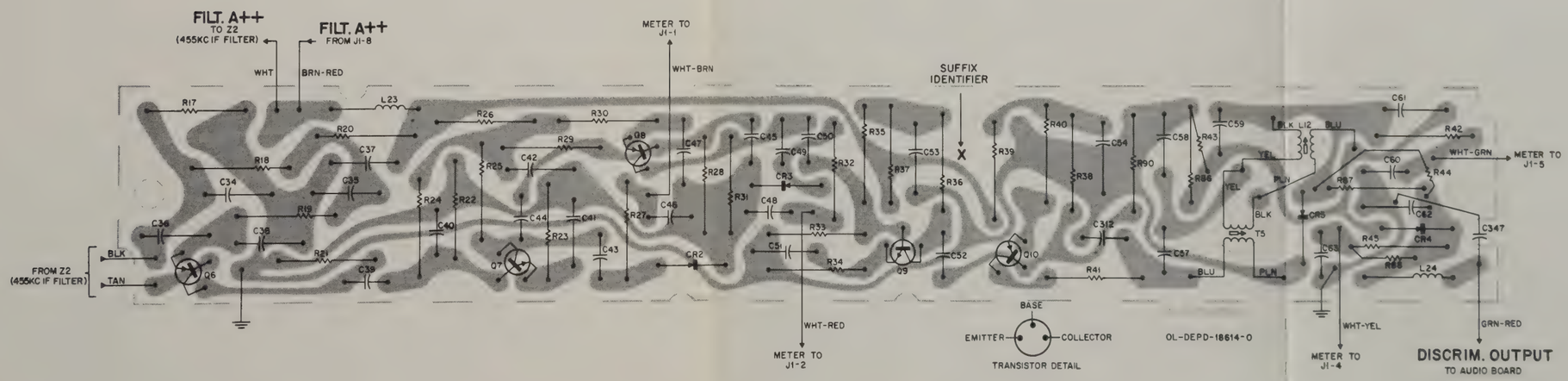
1V80777A93 Channel Element Board
(P/O TLN8619A)

EPD-18927-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C66, 67, 68	21D82428B59	CAPACITOR, fixed: .01 uf ±20%; 200 v

Receiver F3 & F4 Channel
Element Circuit Board Detail
Motorola No. PEPD-18836-O1
10/1/68-RS





REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

455 KC IF Amplifier
Circuit Board Detail
Motorola No. PEPD-18613-O1
10/1/68-RS

PARTS LIST

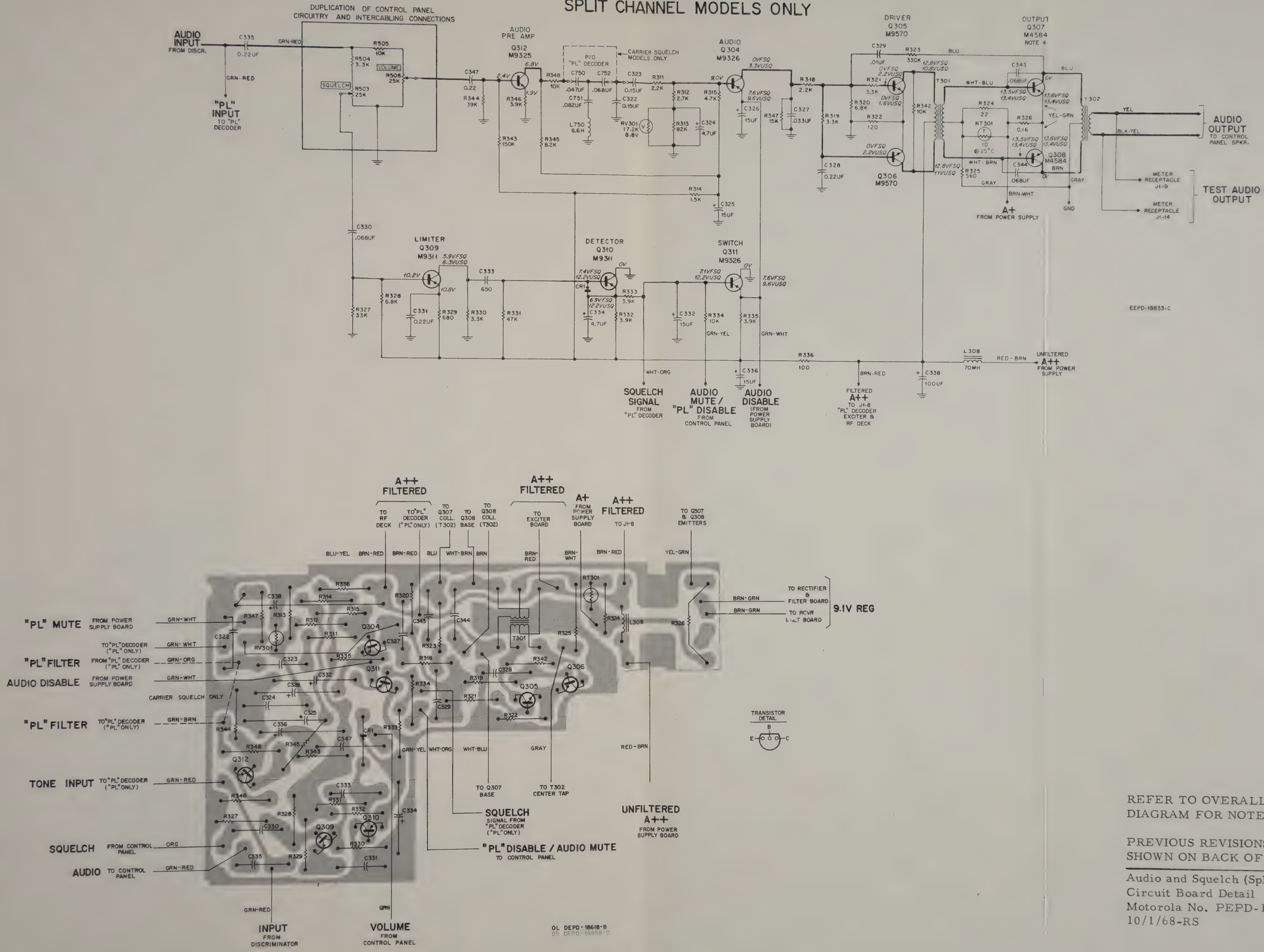
TLN8578A 455 KC Board (Split-Channel)
TLN8308A 455 KC Board (Wide Channel) EPD-14204-C

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uuf ±10%; 500 v
C34, 36, 38, 41, 47, 51	21C82372C01	0.1 uf +80 -20%; 25 v
C35, 37, 42	8C82095G06	0.1 uf; 200 v
C39,44,46,48, 50,52,60,63	21D82428B59	.01 uf +80-20%; 200 v
C40, 45	21C82187B23	820; 200 v
C43, 49	21D82133G23	27; NP0
C53, 54	8D82905G11	0.22 uf; 50 v
C57	21C82633E06	330 ±5%; 100 v (wide channel)
	or21K840049	800 ±5%; 300 v (split-channel)
C58	21K847601	1000 ±5%
C59	21D82133G28	80; N1500
C61	21K859773	2500 ±5%
C62	21C82187B25	3300; 100 v
C312	21K840713	120 ±5%
C347	21D82428B36	2000; 200 v
		SEMICONDUCTOR DEVICE, diode (SEE NOTE)
CR2, 3	48C82921G01	germanium
CR4, 5	48C82139G01	germanium
		COIL, RF:
L12	24C82619C05	incl. 1K867236 CORE, tuning; coded ORG
L23	24D82135G08	choke; 0.62 mh
L24	24D82135G07	choke; 2 mh
		TRANSISTOR: (SEE NOTE)
Q6, 8	48R869003	P-N-P; type M9003
Q7, 9	48R869199	N-P-N; type M9199
Q10	48R869204	P-N-P; type M9204
		RESISTOR, fixed: ±10% 1/2 w; unl. stated
R17	6S6117	5.6K
R18	6S6269	820
R19	6S6432	270
R20, 37	6S6090	470
R21, 30, 38	6S6229	1K
R22, 25, 33, 36	6S6038	1.5K
R23, 34	6S6373	150
R24, 35	6S6394	12K
R26, 39	6S6270	220
R27, 32, 90	6S5591	18K
R28	6S6080	4.7K
R29	6S5659	3.9K
R31, 41	6S6040	680
R40	6S5550	47
R42, 45	6S6398	150K
R43, 44	6S2001	6.8K ±5%
R86, 87	6S488095	18K ±5%
R88	6S5361	120K
		TRANSFORMER:
T5	24C82619C07	incl. 1K867236 CORE, tuning; coded VIO

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

SPLIT CHANNEL MODELS ONLY



REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Audio and Squelch (Split-Channel)
Circuit Board Detail
Motorola No. PEPD-18617-B1
10/1/68-RS

REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A			ADDED GRN-WHT LEAD (AUDIO DISABLE)	Q311 EMITTER
B	TLN8626A-2	Q305, 306	WERE 48R869357	PARTS LIST
		R319	WAS 6S129981, 3.3K	Q306 BASE
		R321		Q305 BASE
	TLN8626A-2	Q305, Q306	WERE 48R869532, M9532	PARTS LIST

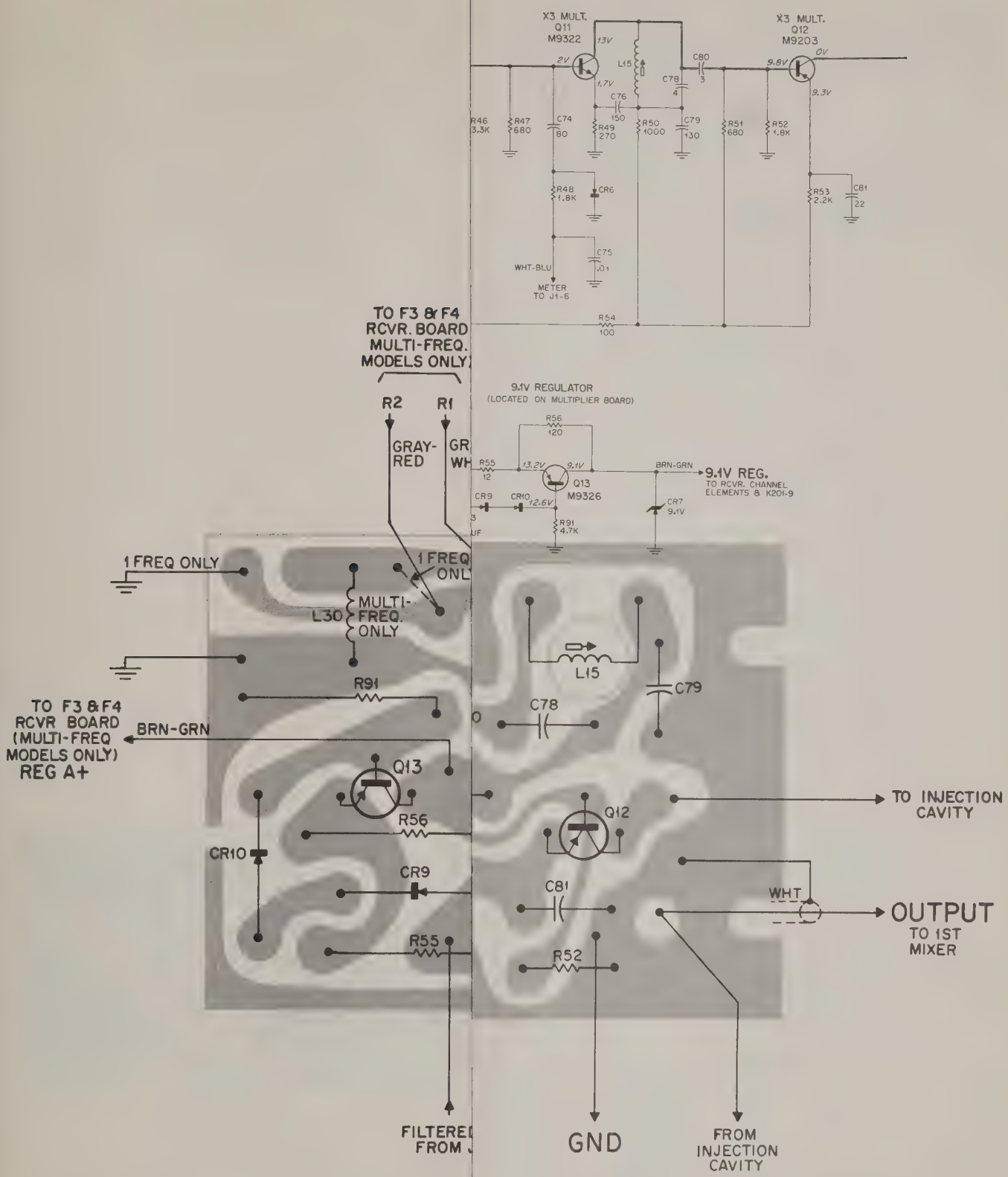
PARTS LIST

TLN8626A Audio & Squelch Kit EPD-18227-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf ±10%; 50 v; unl stated
C322, 323	8D83293B18	.15
C324, 334	23K865137	4.7; 25 v
C325, 326,332, 336	23K865136	15; 25 v
C327	8D82905G08	.033
C328, 331,335	8D83293B02	0.22
C329	8D82905G01	.01
C330, 343, 344	8D82905G04	.068
C333	21K848236	650 ±5%; 500 v
C338	23D82601A25	100 +150-10%; 20 v
C347	8D82905G12	0.22
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1	48C82392B03	silicon
		COIL, audio: choke
L308	25B82878A03	70 mh
		TRANSISTOR: (SEE NOTE)
Q304, 311	48R869326	P-N-P; type M9326
Q305, 306	48R869570	N-P-N; type M9570
Q309, 310	48R869311	P-N-P; type M9311
Q312	48R869325	N-P-N; type M9325
		RESISTOR, fixed: ±5%; 1/4 w; unl stated
R311, 318	6S129804	2.2K
R312	6S128688	2.7K ±10%
R313	6S129145	82K ±10%
R314	6S127803	1.5K ±10%
R315	6S127804	4.7K ±10%
R319, 320, 328	6S129237	6.8K
R321, 335	6S129319	3.9K
R322	6S129617	120 ±10%
R323	6S129473	330K
R324	6S131641	22 ±10%
R325	6S6291	560 ±10%; 1/2 w
R327	6S129526	33K
R329	6S129984	680
R330	6S129981	3.3K
R331	6S128902	47K ±10%
R332, 333, 346	6R129232	3.9K ±10%
R334	6S129668	10K
R336	6S129753	100 ±10%
R342, 348	6S129225	10K ±10%
R343	6S128683	150K
R344	6S129777	39K
R345	6S128686	8.2K ±10%
R347	6S129236	15K
		THERMISTOR:
RT301	6C82769A01	10 ohms ±10% @ 25°C
		VARISTOR:
RV301	6B858401	17.2K ±10%; @ 25°C
		TRANSFORMER: audio driver:
T301	25C82058H01	pri. term. No. 1 term. No. 3 w/center tap @ term. No. 2 total coil res 670 ohms sec. term No. 4 term. No. 6 w/center tap @ term. No. 5; total coil res 13 ohms

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

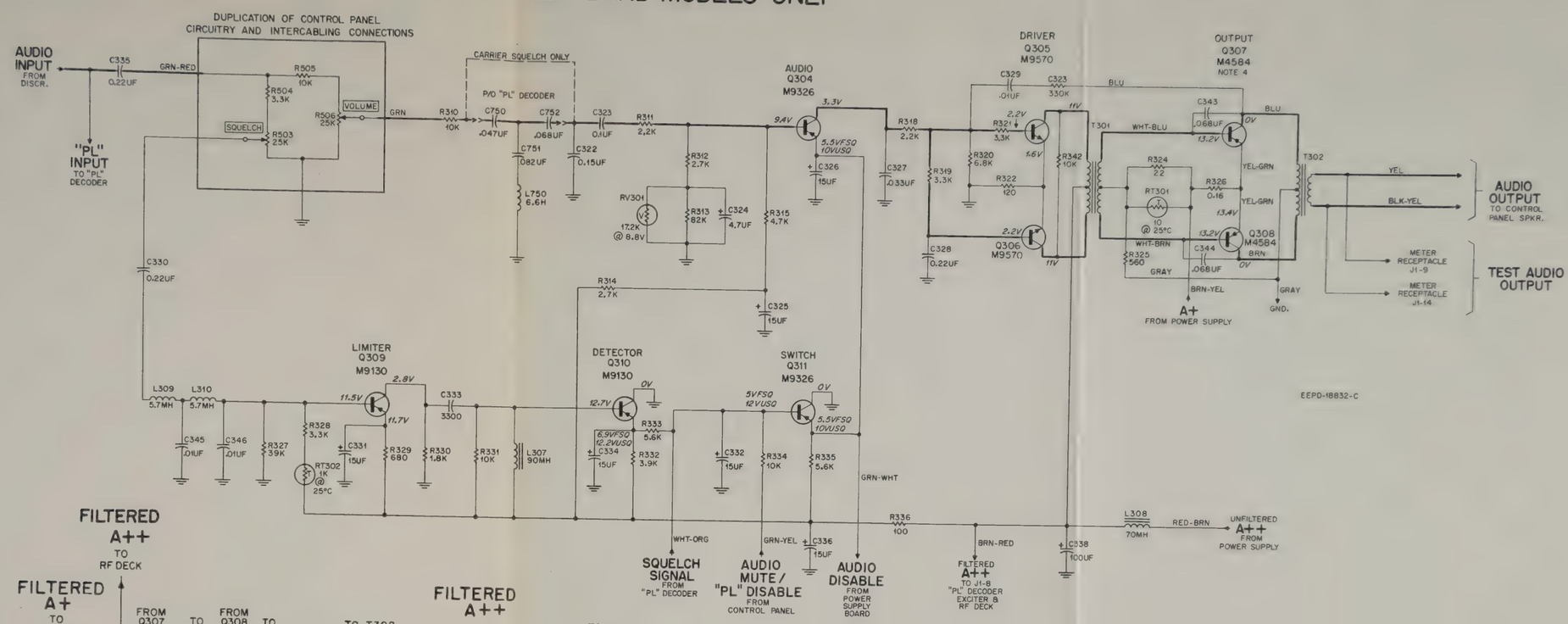


REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

1st Oscillator & Multiplier
Circuit Board Detail
Motorola No. PEPD-18611-A1
10/1/68-RS

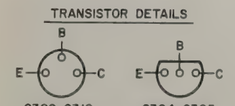
WIDE BAND MODELS ONLY



MODEL TABLE

MODEL	SUFFIX	DESCRIPTION
TLN8525A	2	AUDIO AND SQUELCH BOARD

TRANSISTOR DETAILS



REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Audio and Squelch (Wideband)
Circuit Board Detail
Motorola No. PEPD-18619-A1
10/1/68-RS

REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN8525A-2	Q305, 306	WERE 48K869357 M9357	PARTS LIST

PARTS LIST

TLN8525A Audio & Squelch (Wideband) EPD-18229-A

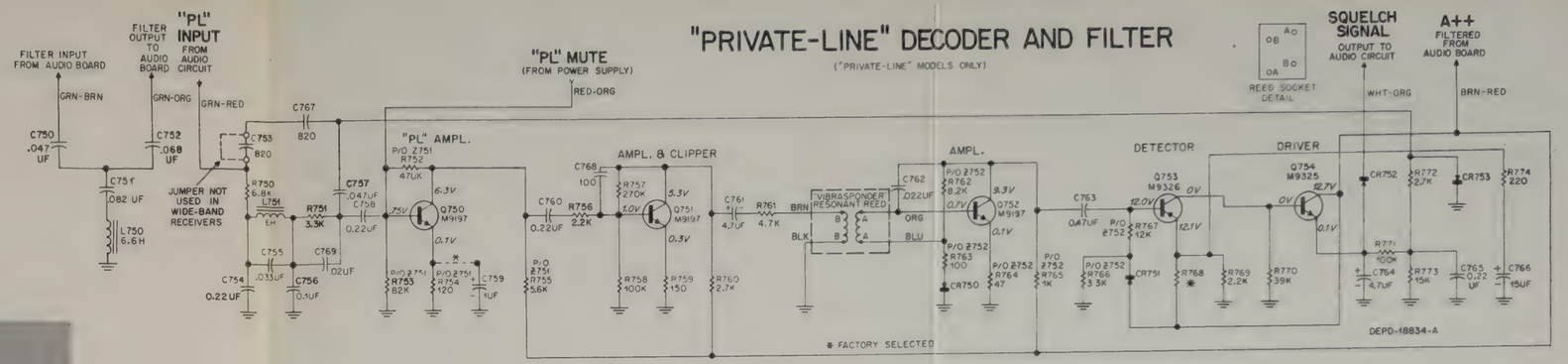
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf ±10%; 50 v; unl stated
C322	8D83293B18	0.15
C323	8D82905G07	0.10; 500 v
C324	23K865137	4.7; 25 v
C325, 326, 331, 332, 334, 336	23K865136	15; 25 v
C327	8D82905G08	.033
C328, 330, 335	8D83293B02	0.22
C329, 345, 346	8D82905G01	.01
C333	8D82905G25	.0033; 100 v
C338	23D82601A25	100 +150-10%; 20 v
C343, 344	8D82905G04	.068
		COIL, audio; choke
L307	25B82738C01	90 mh
L308	25B82878A03	70 mh
L309, 310	24C82835G05	5.7 uh; coded GRN-VIO-RED
		TRANSISTOR: (SEE NOTE)
Q304, 311	48R869326	P-N-P; type M9326
Q305, 306	48R869570	N-P-N; type M9570
Q309, 310	48R869130	P-N-P; type M9130
		RESISTOR, fixed: ±10%; 1/4 w; unl stated
R310	6S129668	10K ±5%
R311, 318	6S129804	2.2K ±5%
R312, 314	6S128688	2.7K
R313	6S129145	82K
R315	6S127804	4.7K
R319, 321, 328	6S129981	3.3K ±5%
R320	6S129237	6.8K ±5%
R322	6S129617	120
R323	6S129473	330K ±5%
R324	6S131641	22
R325	6S6291	560; 1/2 w
R326	17C82350A05	0.16; 1 w
R327	6S128903	39K
R329	6S128599	680
R330	6S129269	1.8K
R331, 334, 342	6S129225	10K
R332	6S129232	3.9K
R333, 335	6S129433	5.6K
R336	6S129753	100
		THERMISTOR:
RT301	6C82769A01	10 ohms
RT302	6B858402	1K ohms
		VARISTOR:
RV301	6B858401	17.2K; 8.8 v
		TRANSFORMER, audio driver:
T301	25C82058H01	pri. term. No. 1 term. No. 3 w/center tap @ term. No. 2 total coil res 670 ohms sec. term. No. 4 term. No. 6 w/center tap @ term. No. 5; total coil res 13 ohms

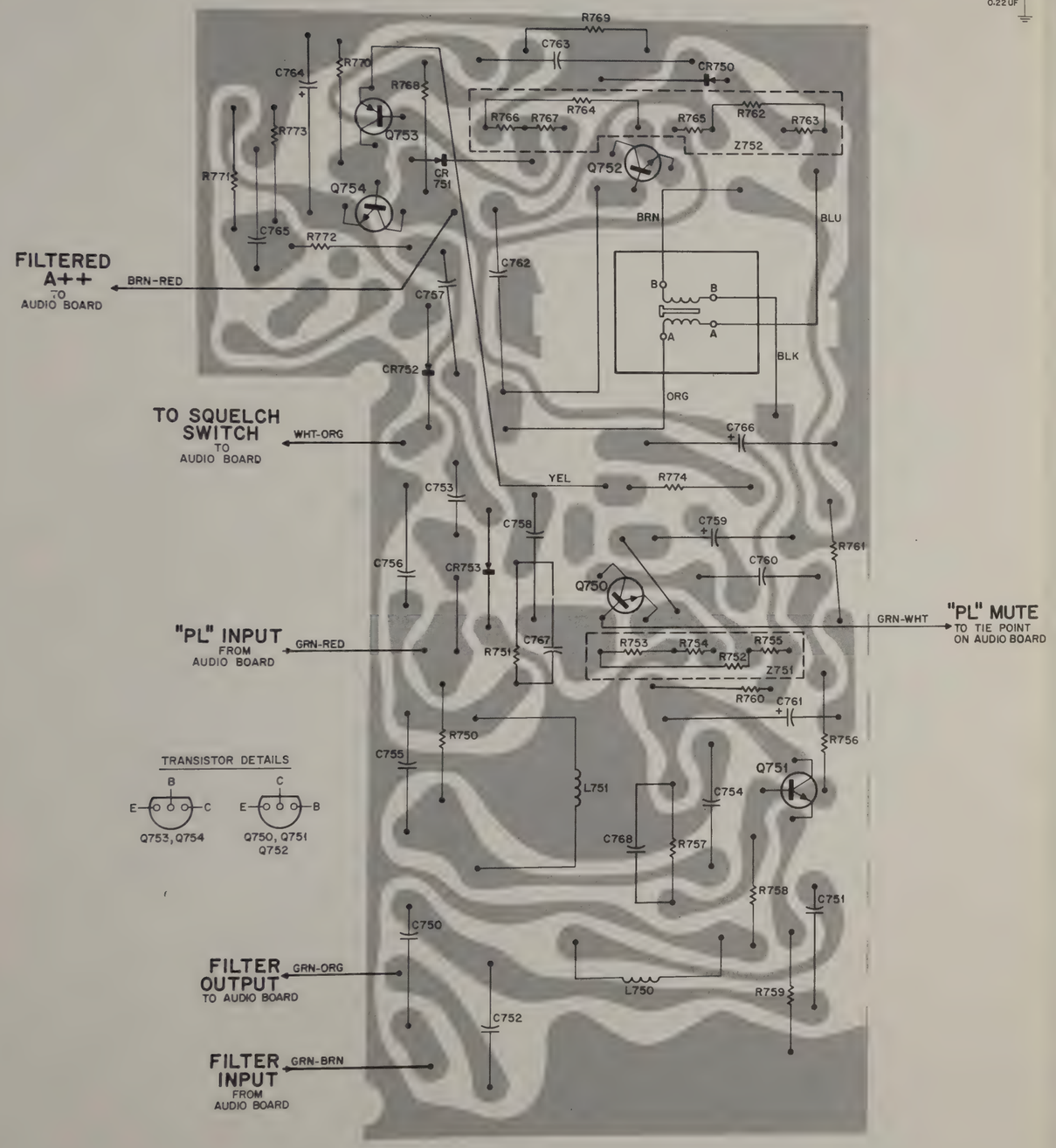
NOTE:

Replacement transistors must be ordered by Motorola part number only for optimum performance.

"PRIVATE-LINE" DECODER AND FILTER

("PRIVATE-LINE" MODELS ONLY)





OL-DEPD-18624-A
BD-DEPD-19532-A

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

"Private-Line" Decoder and Filter
Circuit Board Detail
Motorola No. PEPD-18623-A1
10/1/68-RS

REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN8270AA		ADDED NOTE 2	PARTS LIST

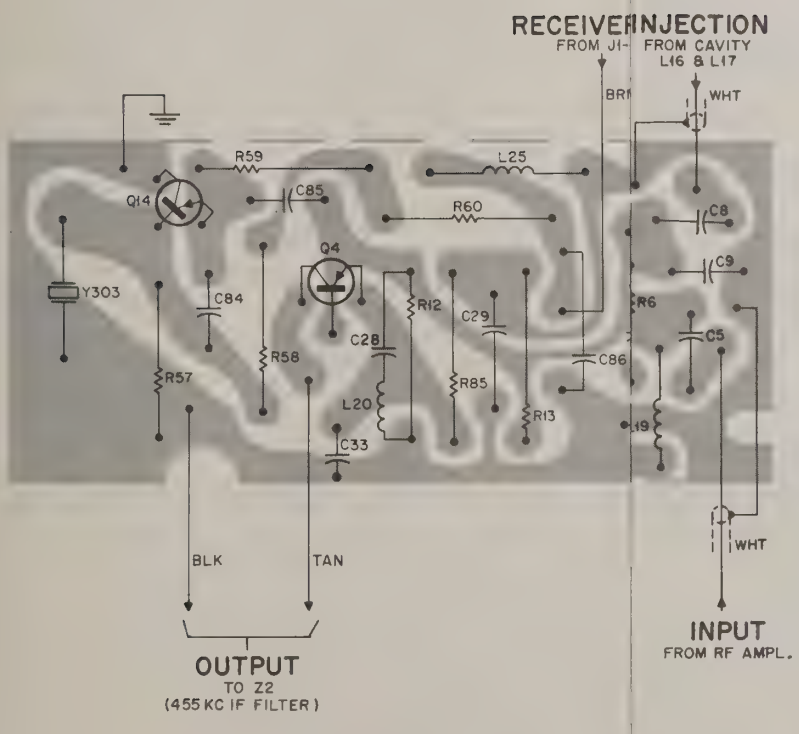
PARTS LIST

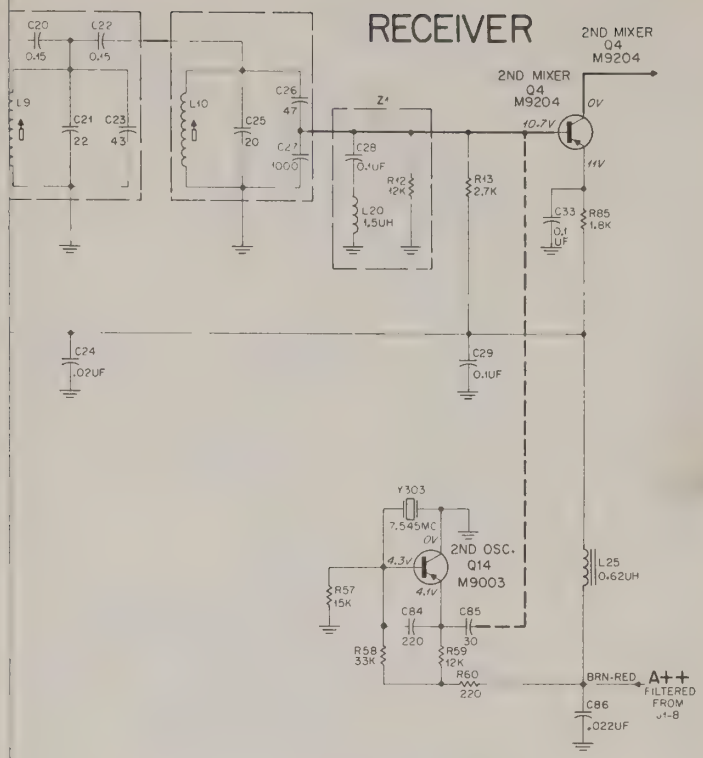
TLN8270AA "Private-Line" Decoder & Filter EPD-14111-F

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf ±10%; 50 v; unl. stated
C750, 757	8D82905G03	.047
C751	8D82905G05	0.15
	or 8D82905G45	.082
C752	8D82905D04	.068
C753, 767	21D82187B21	820 uuf; 200 v
C754, 758, 760, 765	8D82905G11	0.22
C755	8D82905G08	.033
C756	8D83293B11	0.1
C759	23D82783B08	1 ±20%; 35 v
C761, 764	23K865137	4.7 ±20%; 25 v
C762	8D82905G43	.022; 200 v
C763	8D82905G06	0.47
C766	23K865136	15 ±20%; 25 v
C768	21D82133G03	100 uuf ±5%; 500 v; N750
C769	8D82905G23	.02; 200 v
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE 1)
CR750, 751, 753	48C82392B03	silicon
CR752	48C82178A11	germanium
		COIL, audio:
L750	25C82024D02	choke; 6.6 h
L751	25D847527	ass'y; choke; 6 h
		TRANSISTOR: (SEE NOTE 1)
Q750, 751, 752	48R869197	N-P-N; type M9197
Q753	48R869326	P-N-P; type M9326
Q754	48R869325	N-P-N; type M9325
		RESISTOR, fixed: ±10%; 1/4 w unl. stated
R750	6S128687	6.8K
R751	6S129231	3.3K
R752		470K; p/o Z751
R753		82K; p/o Z751
R754		120; p/o Z751
R755		5.6K; p/o Z751
R756	6S128689	2.2K
R757	6S129227	270K
R758, 771	6S129226	100K
R759	6S129862	150
R760, 772	6S128688	2.7K
R761	6S129669	4.7K ±5%
R762		8.2K; p/o Z752
R763		100; p/o Z752
R764		47; p/o Z752
R765		1K; p/o Z752
R766		3.3K; p/o Z752
R767		12K; p/o Z752
R768	6S129753	100
R769	6S129804	2.2K ±5%
R770	6S128903	39K
R773	6S127805	15K
R774	6S127800	220
		NETWORK, resistor:
Z751	51C83481C01	incl. R752, 753, 754, 755
Z752	51C83481C02	incl. R762, 763, 764, 765, 766, & 767
NON-REFERENCED ITEM		
	14C83485C01	SOCKET, "Vibrasponder" female; 4 cont. does not incl. 14B83484C01 INSULATOR

NOTE:

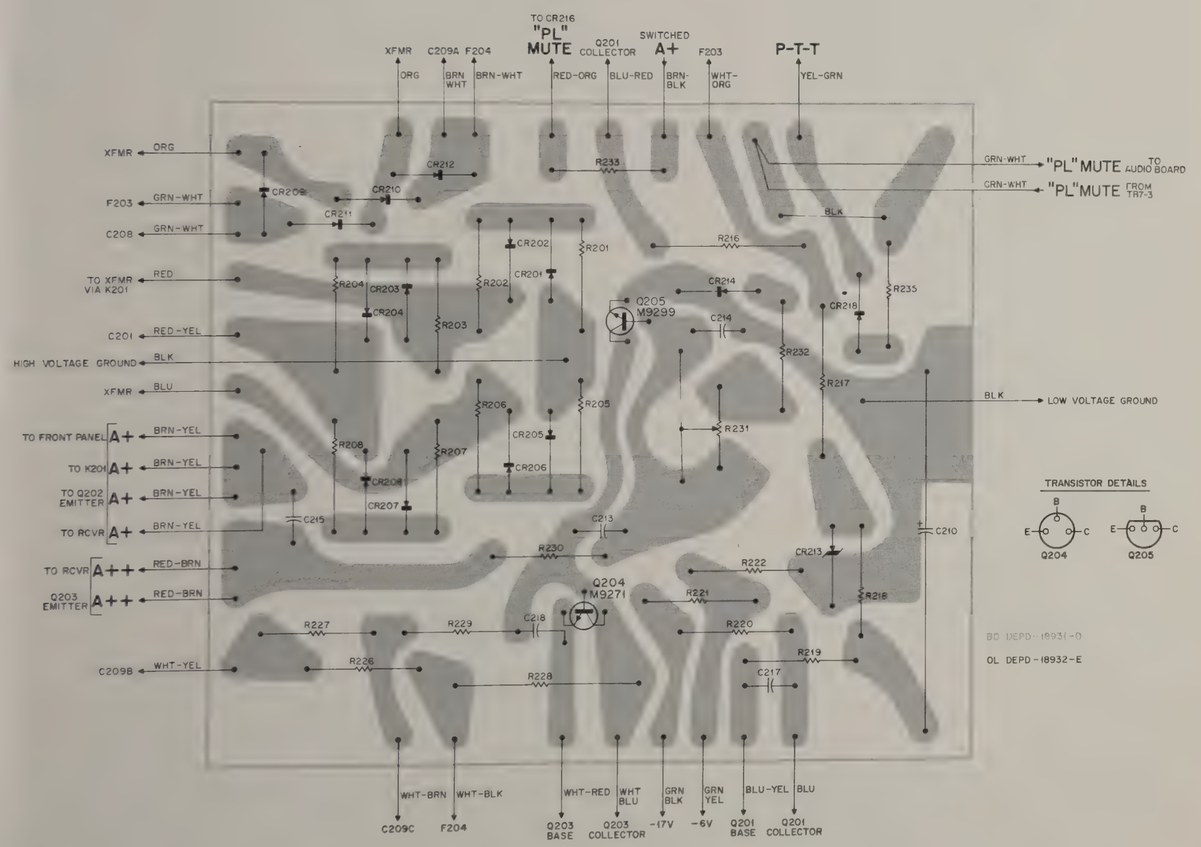
1. Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

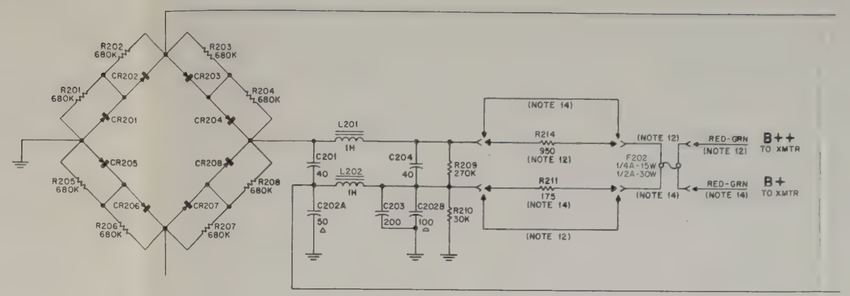


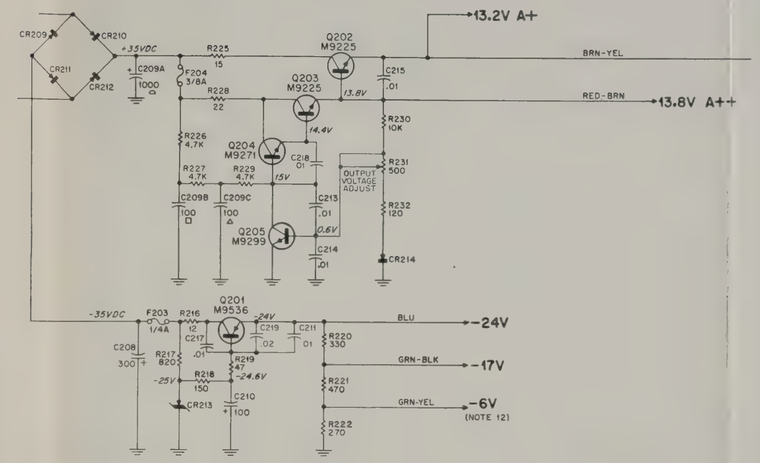


PARTS LIST SHOWN ON
BACK OF THIS DIAGRAM

8 MC IF & 2nd Oscillator
Circuit Board Detail
Motorola No. PEPD-18609-O1
10/1/68-RS







REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN8660A-1	C218	ADDED .01 uf	Q204 EMITTER
B	TLN8660A-2	R235	ADDED 10K	TOP RIGHT OF BOARD
		CR218	ADDED	
C		C219	ADDED	SCHEMATIC DIAGRAM

PARTS LIST

TLN8660A Power Supply Circuit Board EPD-18974-C

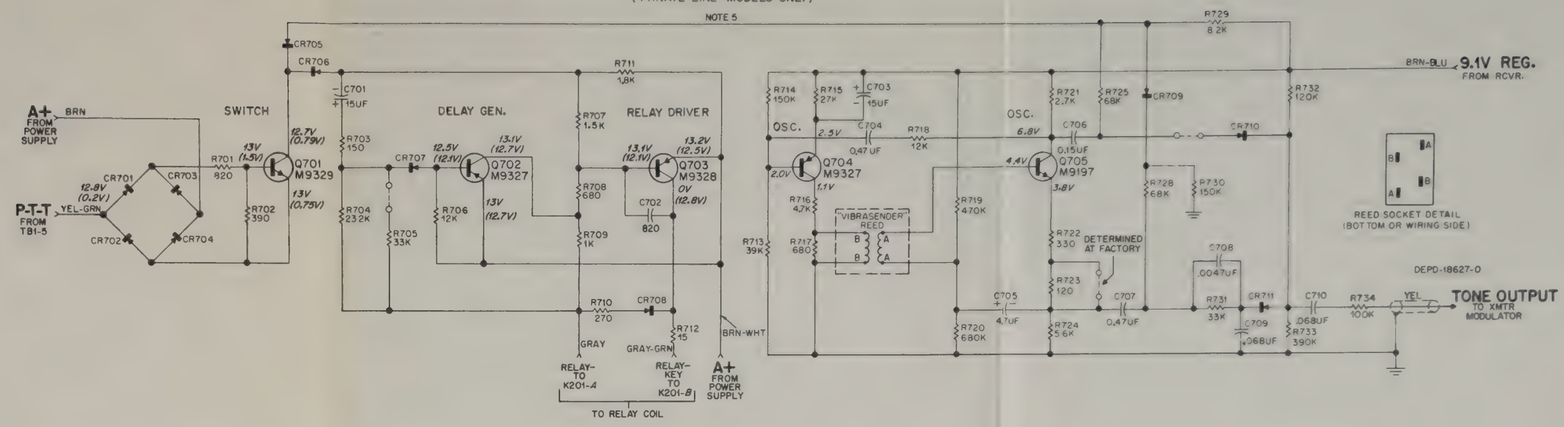
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf:
C210	23C82077C01	100 +150-10%; 35 v
C213, 215, 217, 218	21D82428B59	.01 +80-20%; 200 v
C214	21D82428B40	.01 +60-40%; 250 v
		SEMICONDUCTOR DEVICE, diode: (NOTE)
CR201 thru 208, 210, 212	48C82466H16	silicon
CR209, 211	48C82466H12	silicon
CR213	48D83461E11	silicon; zener type
CR214	48C82178A04	silicon
CR218	48C82392B03	silicon
		TRANSISTOR: (NOTE)
Q204	48R869271	N-P-N; type M9271
Q205	48R869299	N-P-N; type M9299
		RESISTOR, fixed: ±10%; 1/2 w unl stated
R201 thru 208	6S6475	680K
R216	6S118226	12; 1 w
R217	6S5701	820; 1 w
R218	6S6373	150
R219	6S5550	47
R220	6S6022	330
R221	6S6090	470
R222	6S6432	270
R226, 227, 229	6S6080	4.7K
R228	6S2009	22; 2 w
R230	6S5556	10K ±5%
R231	18C83168C01	500 ±20%; 2 w
R232	6S5551	120
R233	6S6477	15K
R235	6S6320	10K

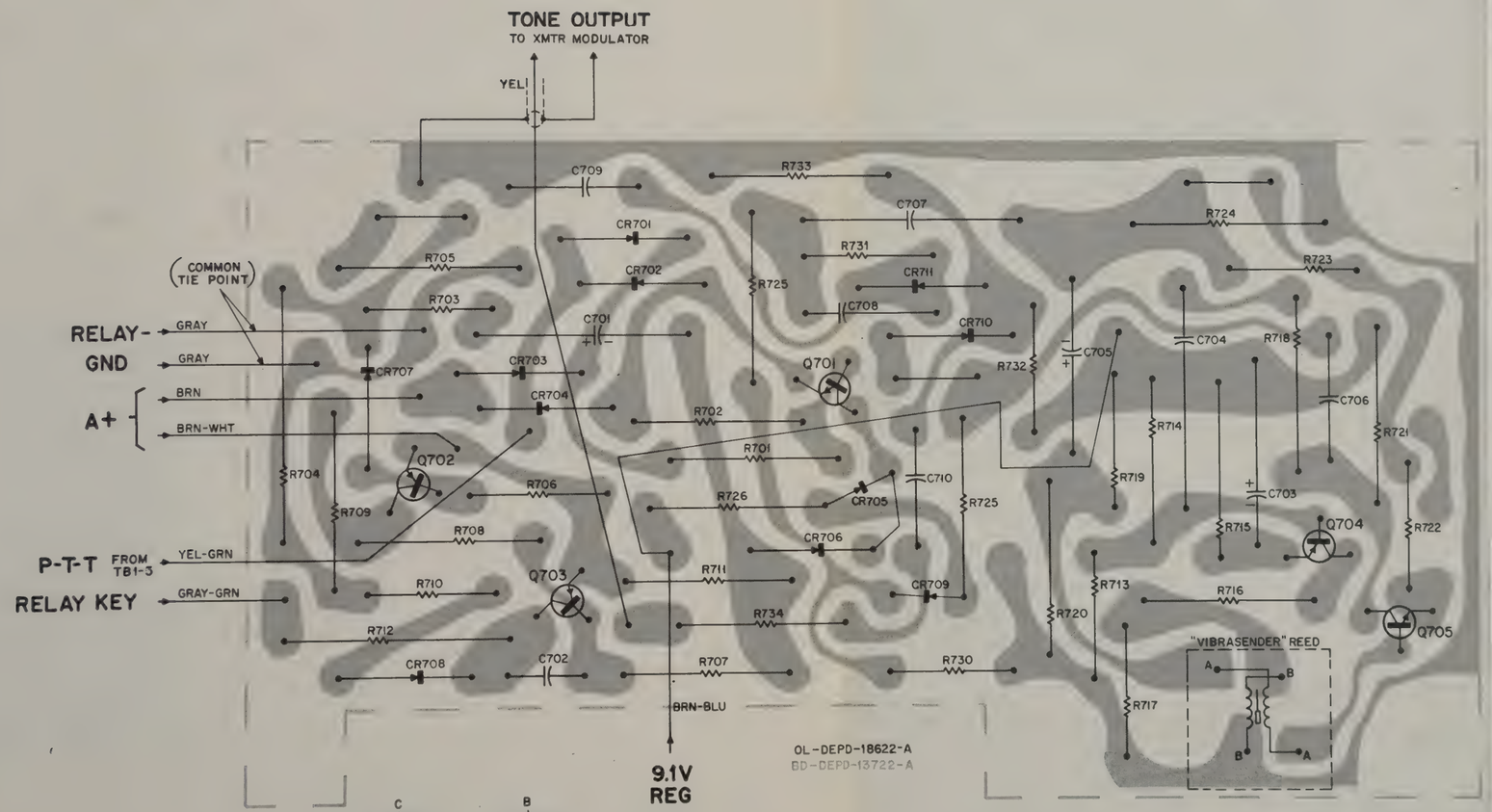
NOTE:

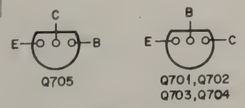
Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

"PRIVATE-LINE" TONE GENERATOR

("PRIVATE-LINE" MODELS ONLY)







TRANSISTOR DETAILS

REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

"Private-Line" Tone Generator
Circuit Board Detail
Motorola No. PEPD-18621-O1
10/1/68-RS

PARTS LIST

TLN8271A "Private-Line" Oscillator and Delay Board
EPD-14229-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf ±10%; 25 v; unl. stated
C701	23D82783B24	15
C702	21D82187B21	820 uuf; 200 v
C703	23K865136	15 ±20%
C704, 707	8D82905G33	0.47 ±20%; 50 v
C705	23K865137	4.7 ±20%
C706	8D82905G34	0.15 ±5%; 50 v
C708	8D82905G26	.0047; 100 v
C709, 710	8D82905G04	.068; 50 v
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR701 thru 710	48C82392B03	silicon
CR711	48C82392B04	silicon
		TRANSISTOR: (SEE NOTE)
Q701	48R869329	N-P-N; type M9329
Q702, 704	48R869327	P-N-P; type M9327
Q703	48R869328	P-N-P; type M9328
Q705	48R869197	N-P-N; type M9197
		RESISTOR, fixed: ±5%; 1/2 w unl. stated
R701	6S119172	820
R702	6S400804	390
R703	6S129862	150 ±10%; 1/4 w
R704	6D83175C32	23.2K ±10%; 1/4 w
R705	6S2068	33K
R706, 718	6S129887	12K
R707	6S400459	1.5K
R708	6S5651	680
R709	6S6411	1K
R710	6S129752	270 ±10%; 1/4 w
R711	6S2089	1.8K ±10%
R712	6S118227	15 ±10%; 1 w
R713	6S129777	39K
R714	6S5559	150K
R715	6S129886	27K; 1/4 w
R716	6S3924	4.7K
R717	6S129984	680; 1/4 w
R719	6K129149	470K; 1/4 w
R720	6R5775	680K
R721	6R5577	2.7K
R722	6K129806	330; 1/4 w
R723	6K129617	120
R724	6S129982	5.6K; 1/4 w
R725	6K129144	68K ±10%; 1/4 w
R728	6R6074	68K ±10%
R729	6S2004	8.2K ±10%
R730	6S128683	150K; 1/4 w
R731	6S129526	33K; 1/4 w
R732	6K128987	120K; ±10%; 1/4 w
R733	6R5777	390K
R734	6S5553	100K

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

PARTS LIST

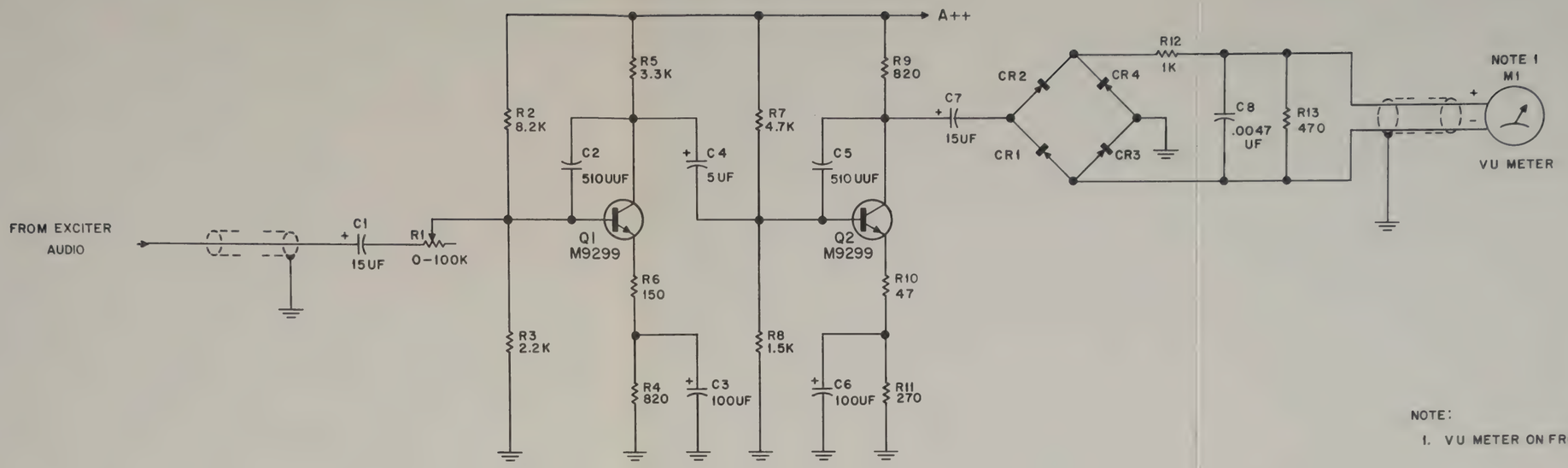
1V80738A21 455 KC Filter Amplifier Board EPD-18226-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C30	21D82428B20	220 uuf ±20%; 100 v
C31	21D82428B19	.01 uf ±20%; 100 v
C32	21C82372C01	0.1 uf +80-20%; 25 v
		TRANSISTOR: (SEE NOTE)
Q5	48R869003	P-N-P; type M9003
		RESISTOR, fixed: ±10%; 1/4 w unl stated
R14	6K129231	3.3K
R15	6K128687	6.8K
R16	6K127804	4.7K
NON-REFERENCED ITEM		
	1V80721A78	CIRCUIT BOARD ASSEMBLY (eyeleted)

NOTE:

Replacement transistors must be ordered by Motorola part number only for optimum performance.

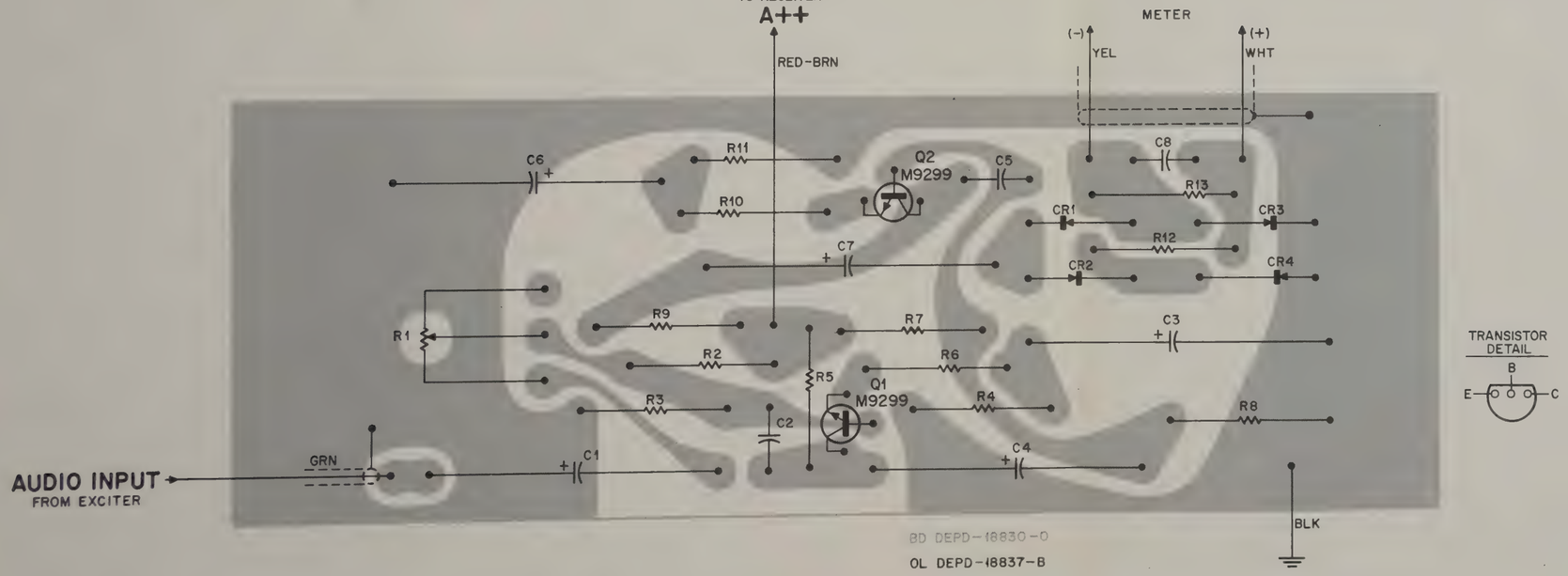
455 KC Filter Amplifier (Wideband)
Circuit Board Detail
Motorola No. PEPD-18615-O1
10/1/68-RS



NOTE:

1. VU METER ON FRONT PANEL.

DEPD-18839-A



BD DEPD-18830-0

OL DEPD-18837-B

PREVIOUS REVISIONS AND PARTS LIST
SHOWN ON BACK OF THIS DIAGRAM

Model TLN1219A/TLN8624A VU Meter
Circuit Board Detail
Motorola No. PEPD-18838-B1
10/1/68-RS

REVISIONS

DIAG. ISSUE	CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN8624A	C5	WAS 570 MMF	Q2 BASE
B	TLN8624A		REPLACED WITH MODELS TLN8948A AND TLN8949A (NOMENCLATURE CHANGE ONLY).	PARTS LIST

PARTS LIST

TLN8948A VU Meter Kit — PL-203-O

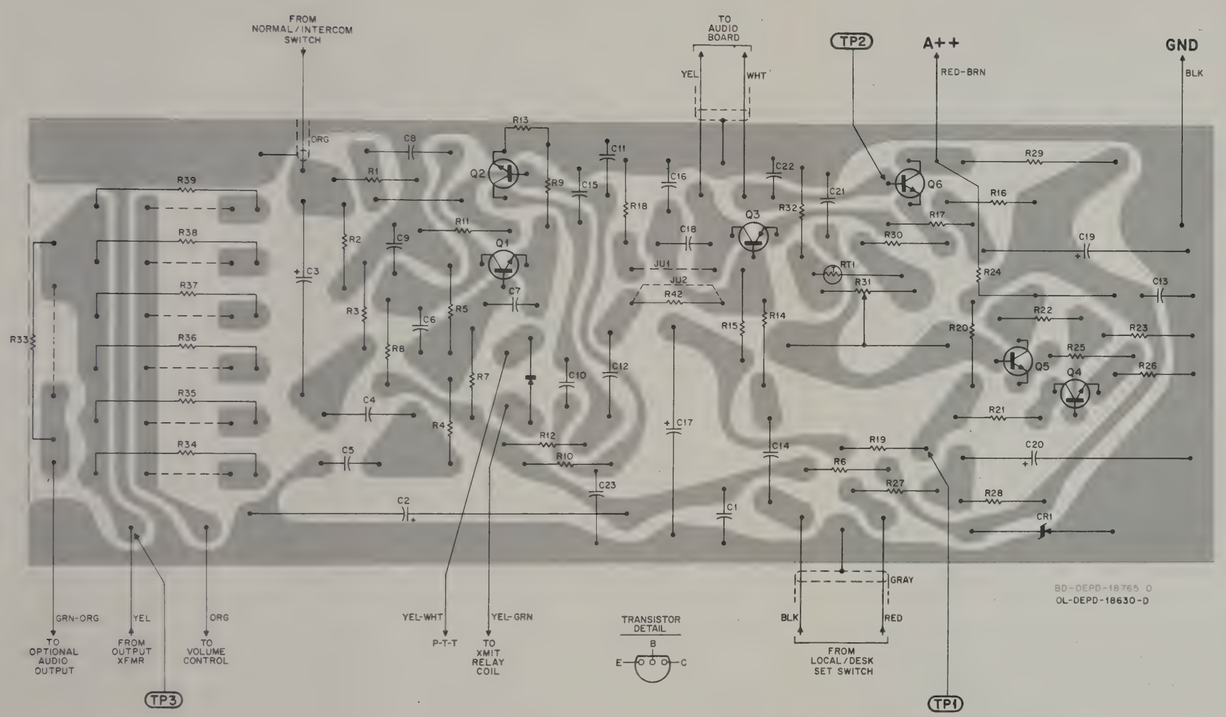
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C1, 7	23D82601A31	15 uf +150-10%: 25 v
C2, 5	21K845214	510 uuf ±5%: 300 v
C3,	23D82601A12	100 uf +150-10%: 6 v
C4	23D82601A11	5 uf +33-10%: 25 v
C8	21D82428B27	.0047 uf ±10%: 100 v
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1, 2, 3, 4	48C82178A04	germanium
		TRANSISTOR: (SEE NOTE)
Q1, 2	48R869299	N-P-N; type M9299
		RESISTOR, fixed: ±10%; 1/2 w unl. stated
R1	18D82338B13	var: 100K; 1/4 w
R2	6S2004	8.2K
R3	6S6069	2.2K
R4, 9	6S6269	820
R5	6S5531	3.3K
R6	6S6373	150
R7	6S6080	4.7K
R8	6S6038	1.5K
R10	6S5550	47
R11	6S6432	270
R12	6S6229	1K
R13	6S6090	470

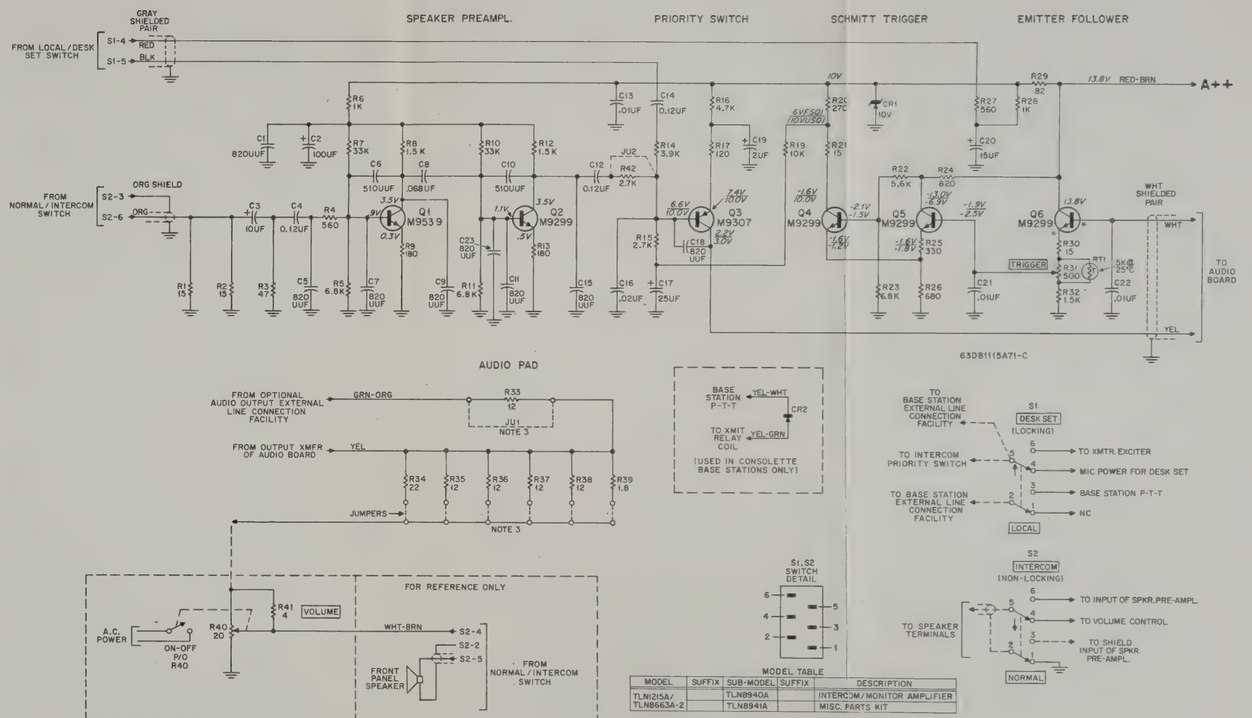
TLN8949A Miscellaneous Parts Kit — PL-204-O

M1	72C83270G01	METER, audio level: -20 to +3 VU

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.





MODEL	SUFFIX	SUB-MODEL	SUFFIX	DESCRIPTION
TLN1215A/ TLN8663A-2		TLN8940A		INTERCOM/MONITOR AMPLIFIER
		TLN8941A		MISC. PARTS KIT

MODEL TABLE

NOTES:

1. -13.0 V: TOP VOLTAGE INDICATES INTERCOM MODE. -6.9 V: BOTTOM VOLTAGE INDICATES RECEIVE MODE.
2. (*) INDICATES VOLTAGE VARIES WITH SQUELCH CONTROL SETTING.
3. JUMPERS ON CIRCUIT BOARD MUST BE USED OR CUT AS REQUIRED TO ADJUST AUDIO PAD ACCORDING TO THE PARTICULAR INSTALLATION. SEE JUMPER TABLE.
4. REMOVE JUMPER JU2 ONLY IN 25-50 MC CONSOLETTE BASE STATIONS.

JUMPER TABLE

NO. OF DESK SETS	OMIT RESISTORS	REQUIRED RESISTORS
1	R33, 34, 35, 36	R37, 38, 39
2	R39	R33, 34, 35, 36, 37, 38
3	R38, 39	R33, 34, 35, 36, 37
4, 5, 6	R34, 38, 39	R33, 35, 36, 37
Supervisory Desk Set	R35, 36, 37, 38, 39	R33, 34

EPD-19499-C

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Intercom Amplifier Schematic Diagram
And Circuit Board Detail
Motorola No. PEPD-18857-D1
10/1/68-RS

REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN8663A		EXTENSIVE CIRCUIT AND COMPONENT CHANGES AT START OF PRODUCTION	SCHEM. DIAG. & PARTS LIST
B	TLN8663A-1	C23	ADDED 820 uuf	Q2 BASE
		Q1	WAS 48R869539, TYPE M9539	SPEAKER PREAMPL.
		R18	REMOVED 6K128686, 8.2K (WAS CONNECTED BETWEEN GROUND AND Q3 EMITTER VIA JUMPER JU1)	
		R21	WAS 6K129620, 560 OHMS	Q4 COLLECTOR
		R26	WAS 6K129753, 120 OHMS	Q5 EMITTER CIRCUIT
		R30	WAS 6S128688, 2.7K	Q6 EMITTER
		R32	WAS 6K128599, 680 OHMS	Q6 EMITTER CIRCUIT
		RT1	THERMISTOR ADDED	
C	TLN8663A-2	R42	ADDED 2.7K	Q3 BASE
D	TLN8663A-2		REPLACED WITH TLN8940A AND TLN8941A. (NOMENCLATURE CHANGE ONLY.)	PARTS LIST

PARTS LIST

TLN8940A Intercom Kit — PL-201-O

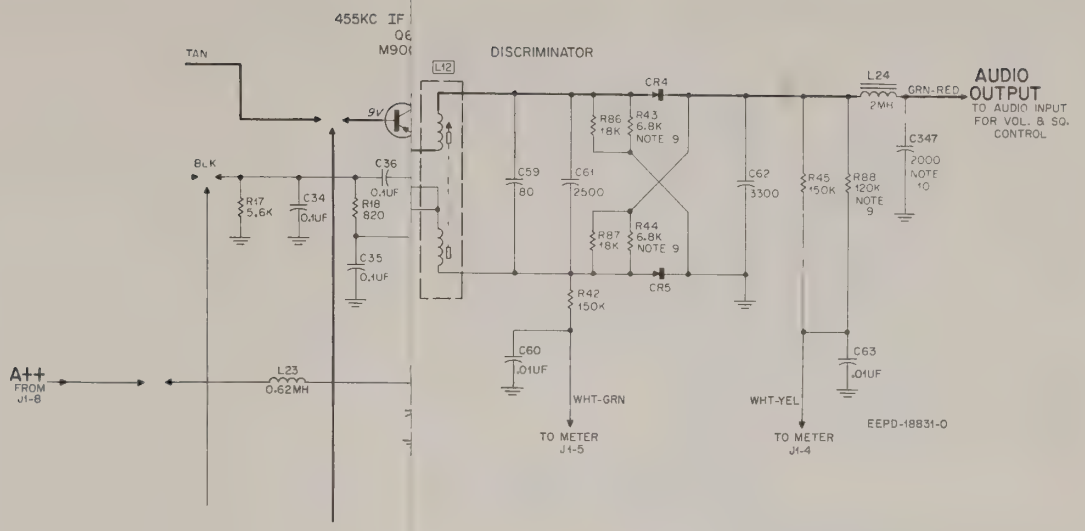
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf; unl. stated
C1, 5, 7, 9, 11, 15, 18, 23	21D82187B21	820 uuf ±10%; 200 v
C2	23D82601A21	100 +100-0%; 10 v
C3	23D82601A23	10 +150-10%; 20 v
C4, 12, 14	8D82905G09	0.12 ±10%; 50 v
C6, 10	21K845214	510 uuf ±5%; 300 v
C8	8D82905G04	.068 ±10%; 200 v
C13, 21, 22	21D82428B59	.01 +80-20%; 200 v
C16	21D82428B26	.02 +80-20%; 200 v
C17	23D82601A26	25 +150-10%; 20 v
C19	23D82601A34	2 +150-10%; 25 v
C20	23D82601A31	15 +150-10%; 25 v
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1	48D82256C28	silicon; zener type; 10 v
CR2	48C82466H12	rectifier; SR1151
		TRANSISTOR: (SEE NOTE)
Q1	48R869539	N-P-N; type M9539
Q2, 4, 5, 6	48R869299	N-P-N; type M9299
Q3	48R869307	P-N-P; type M9307
		RESISTOR, fixed: ±10%; 1/4 w unl. stated
R1, 2, 21, 30	6R131377	15
R3	6K129233	47
R4, 27	6K129620	560
R5, 11	6K128687	6.8K
R6, 28	6K127802	1K
R7, 10	6K127807	33K
R8, 12, 32	6K127803	1.5K
R9, 13	6K129662	180
R14	6K129232	3.9K
R15, 42	6K128688	2.7K
R16	6K127804	4.7K
R17	6K129753	120
R19	6K129225	10K
R20	6K129752	270
R22	6K129982	5.6K ±5%
R23	6K129237	6.8K ±5%
R24	6K129432	820
R25	6K129806	330 ±5%
R26	6K129984	680 ±5%
R29	6R488113	82; 1 w
R31	18C83168C01	var; 500 ±20%; 2 w
R33, 35, 36, 37, 38	6R118226	12; 1 w
R34	6R488026	22; 1 w
R39	17K890469	1.8; 1 w
		THERMISTOR:
RT1	6C82769A07	5020 ohms ±10%; @25°C

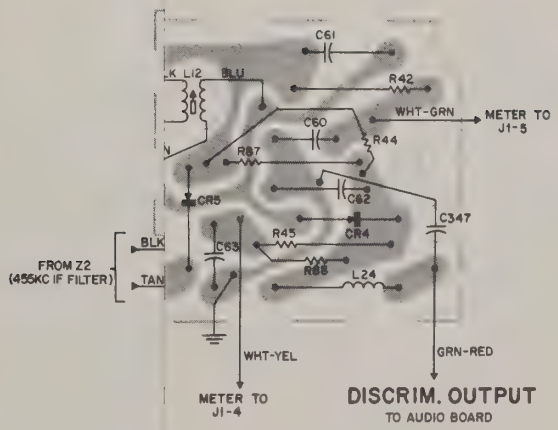
TLN8941A Miscellaneous Parts Kit — PL-202-O

		RESISTOR, fixed: ±10%; 1/4 w unl. stated
R40	18C82528D03	var; 20; 2 w; incl. spst switch
R41	17D82177B03	4; 5 w
		SWITCH, lever:
S1	40C83303G05	2 form "C"; non-locking
S2	40C83303G04	2 form "C"; locking

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

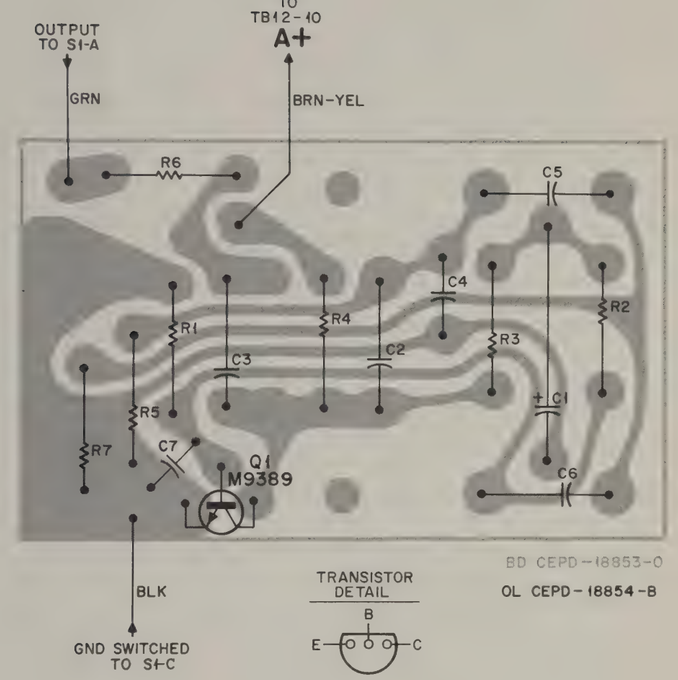




REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

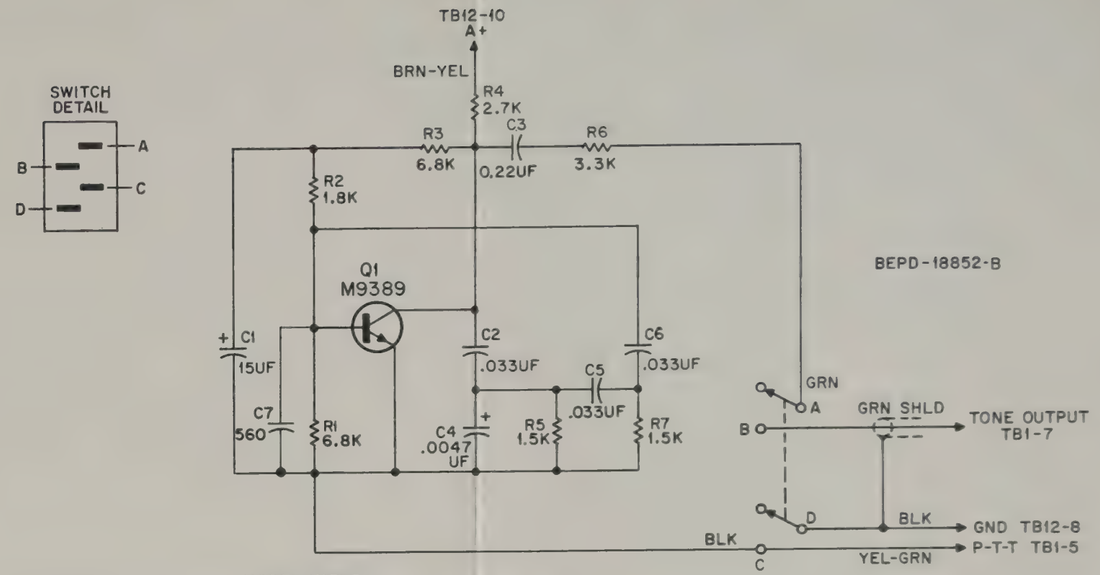
455 KC IF Amplifier
Circuit Board Detail
Motorola No. PEPD-18613-O1
10/1/68-RS



BD CEPD-18853-0

TRANSISTOR DETAIL

OL CEPD-18854-B



MODEL TABLE

MODEL	SUFFIX	SUB-MODEL	SUFFIX	DESCRIPTION
TLN1216A/TLN8664A		TLN8942A		ALERT TONE KIT
		TLN8943A		MISC. PARTS KIT

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

TLN1216A/TLN8664A Alert Tone Kit
Schematic and Circuit Board Detail
Motorola No. PEPD-18856-B1
10/1/68-RS

REVISIONS

DIAG. ISSUE	BOARD AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
A	TLN8664A-1	C7	ADDED 560 uuf	Q1 EMITTER
B	TLN8942A TLN8943A		REPLACES TLN8664A (NOMENCLATURE CHANGE ONLY)	PARTS LIST

PARTS LIST

TLN8942A Alert Tone Kit — PL-182-O

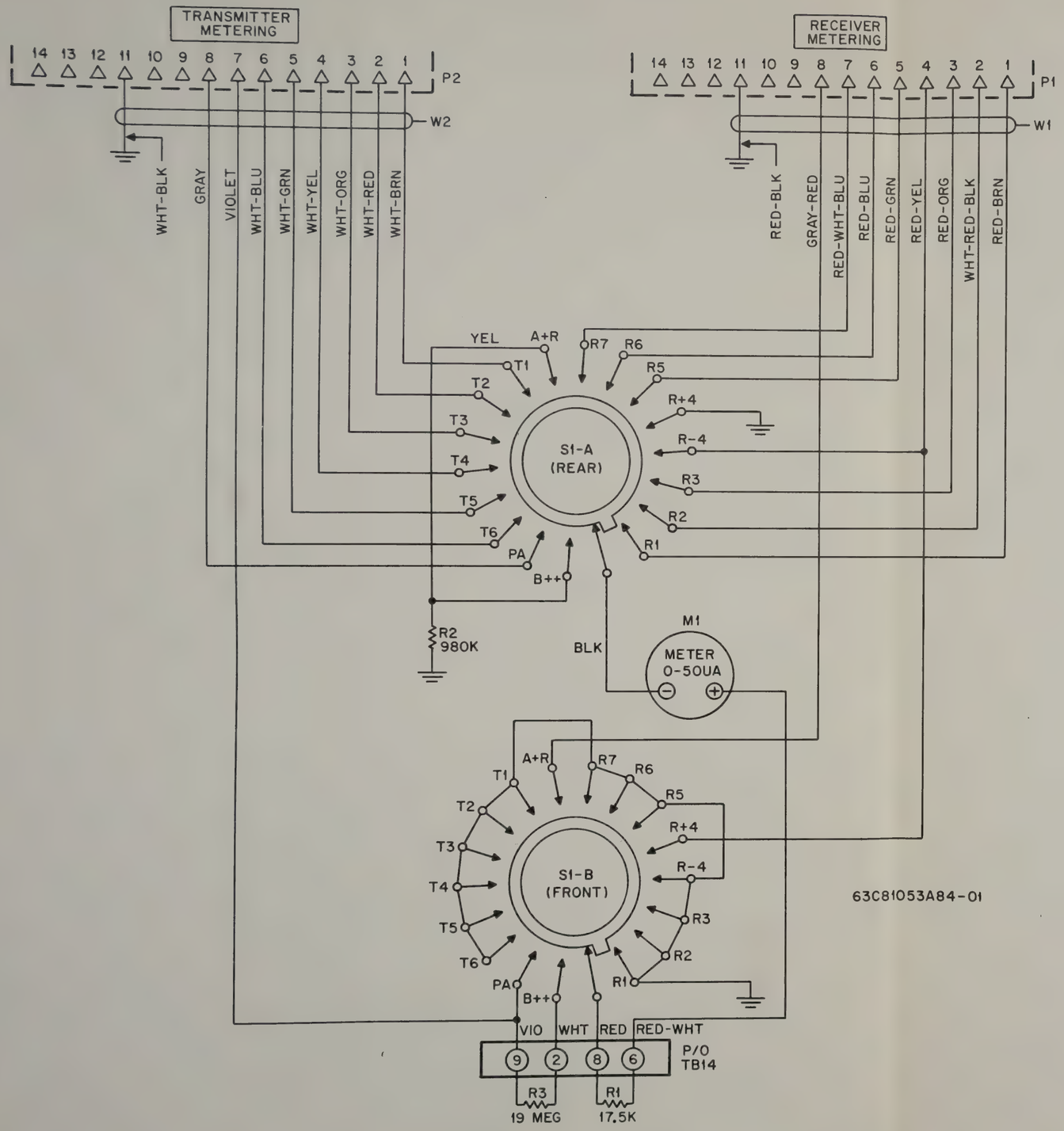
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C1	23D83214C02	15 uf ±20%; 25 v
C2, 5, 6	8D82905G08	.033 uf ±10%; 50 v
C3	8D82905G11	0.22 uf ±10%; 50 v
C4	21D82428B27	.0047 uf ±10%; 100 v
C7	21C82187B06	560 uuf ±10%; 50 v
		TRANSISTOR: (SEE NOTE)
Q1	48R869389	N-P-N; type M9389
		RESISTOR, fixed: ±10%; 1/4 w
R1, 3	6S128687	6.8K
R2	6S129269	1.8K
R4	6S128688	2.7K
R5, 7	6S127803	1.5K
R6	6S129231	3.3K

TLN8943A Miscellaneous Parts Kit — PL-183-O

S1	40C83303G03	SWITCH, lever: dpst; 2-position; non-locking
NON-REFERENCED ITEMS		
	7B83664G01	BRACKET, Alert Tone
	64D83071G07	PANEL, insert

NOTE:

Replacement transistors must be ordered by Motorola part number only for optimum performance.



63C81053A84-01

NOTE:

B++ READS 1000V FULL SCALE OR 20V PER MICROAMPERE.

MODEL	SUFFIX	DESCRIPTION
TLN8623A		DC METERING KIT

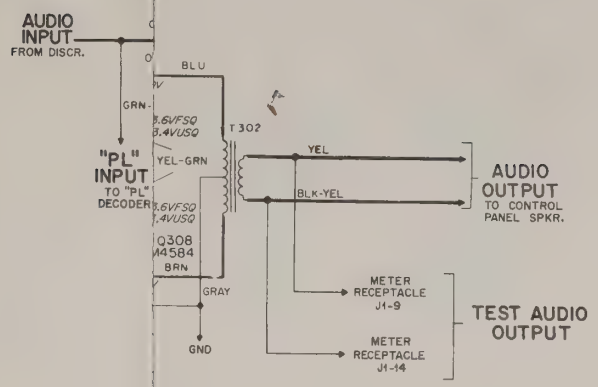
PARTS LIST

TLN8623A DC Metering Kit EPD-19255-O

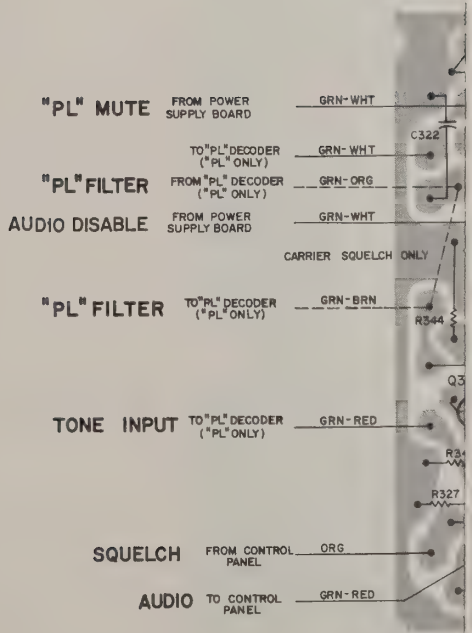
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		AMMETER, DC:
M1	72C83319G01	0-50 microamperes: internal res 2560 ohms ±10%
		CONNECTOR, plug:
P1, 2	28B864669	male: 12 cont: does not incl 15A82798H01 SHELL
		RESISTOR, fixed: 1/2 w
R1	6K855337	17.5K ±2%
R2	6K811974	980K ±2%
R3	6D82475B64	19 meg ±1%
		SWITCH, rotary:
S1	40C83106B01	2 section; each section single pole; 18 position; non-shorting
		CABLE ASSEMBLY, special purpose:
W1-2	1V80775A50	c/o misc. leads, laced

DC Metering Kit
Schematic Diagram
Motorola No. 63C81053A84-O1
10/1/68-RS

5/A15.4



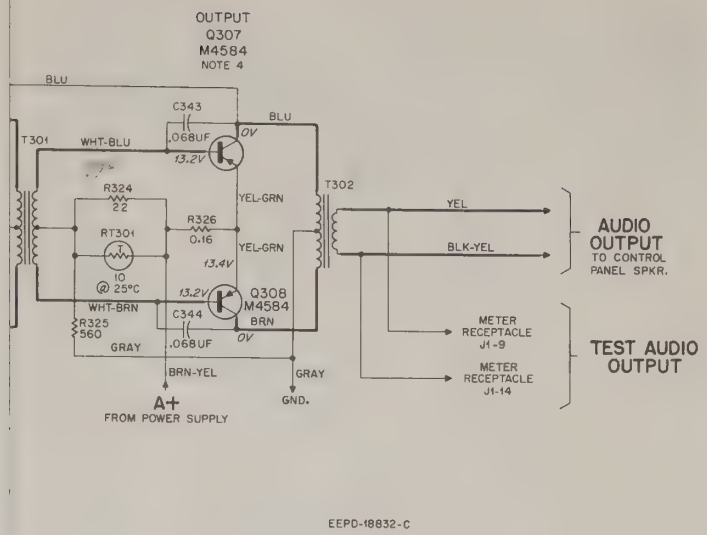
EEPD-18833-C



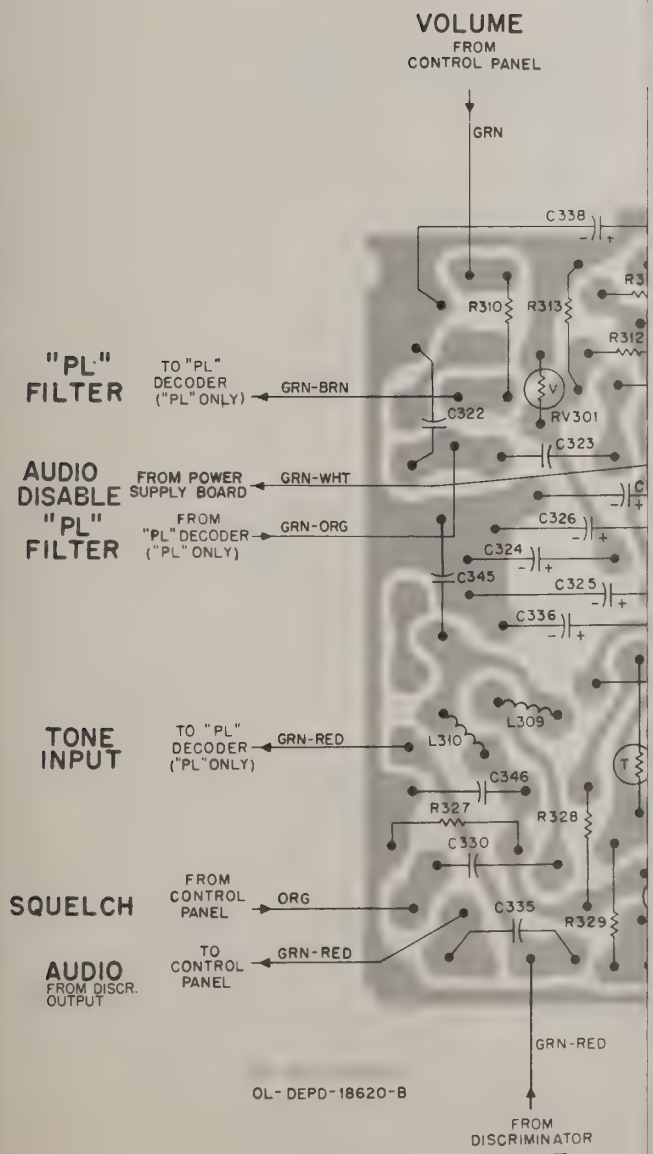
REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Audio and Squelch (Split-Channel)
Circuit Board Detail
Motorola No. PEPD-18617-B1
10/1/68-RS



EEPD-18832-C

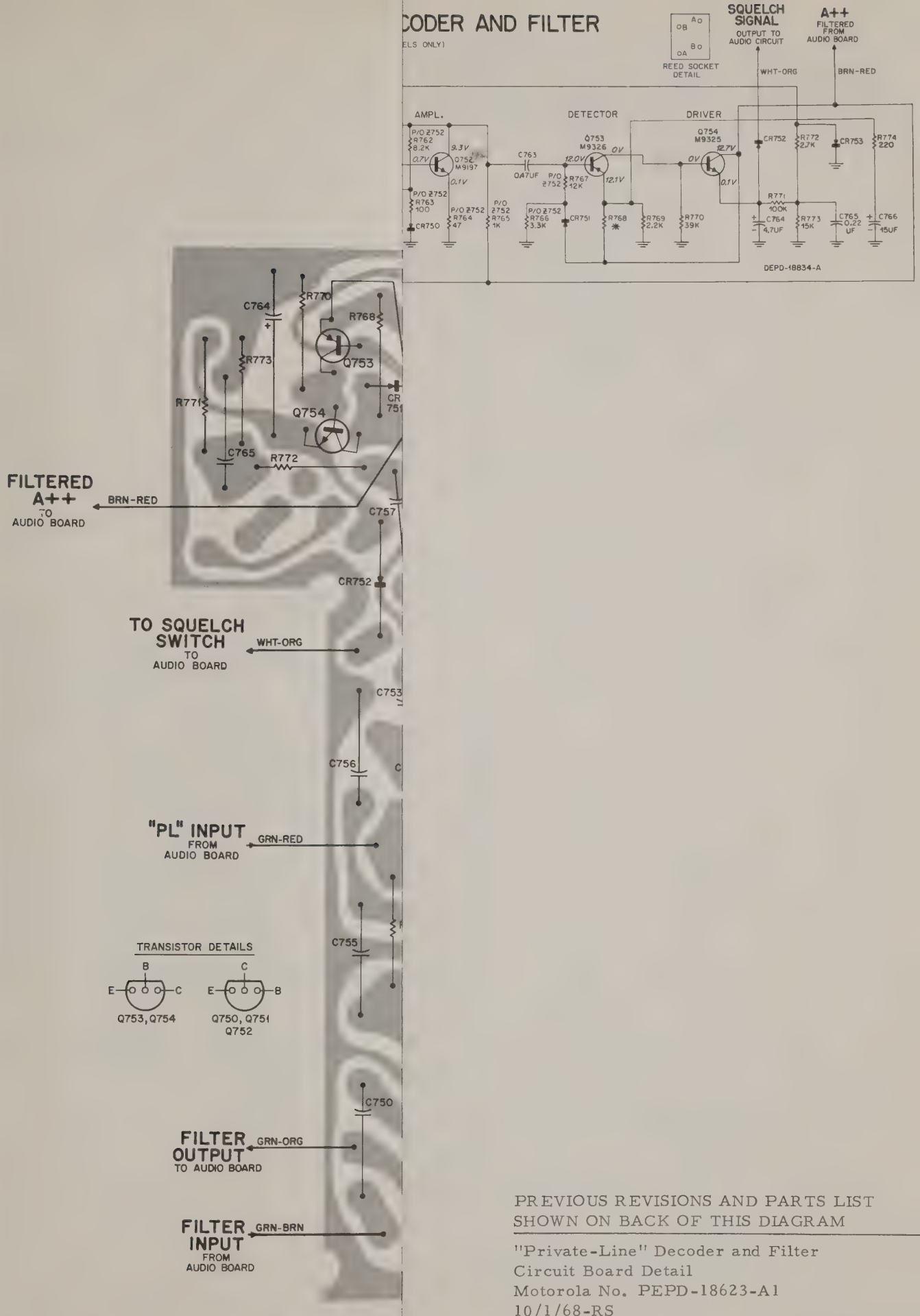


OL-DEPD-18620-B

REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

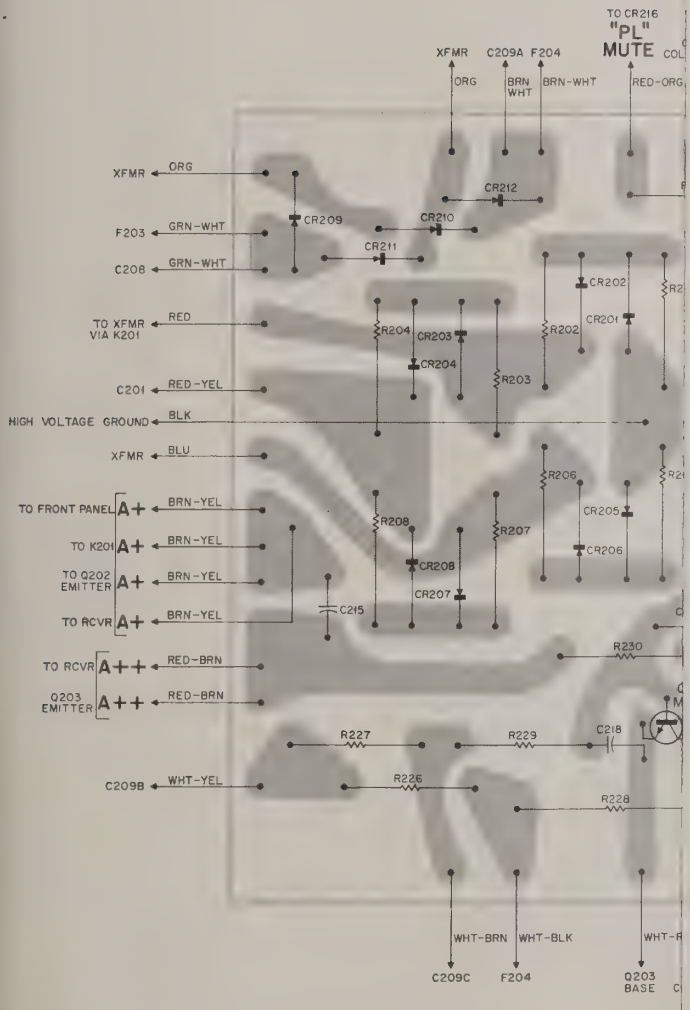
PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Audio and Squelch (Wideband)
Circuit Board Detail
Motorola No. PEPD-18619-A1
10/1/68-RS



PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

"Private-Line" Decoder and Filter
Circuit Board Detail
Motorola No. PEPD-18623-A1
10/1/68-RS



PARTS LIST

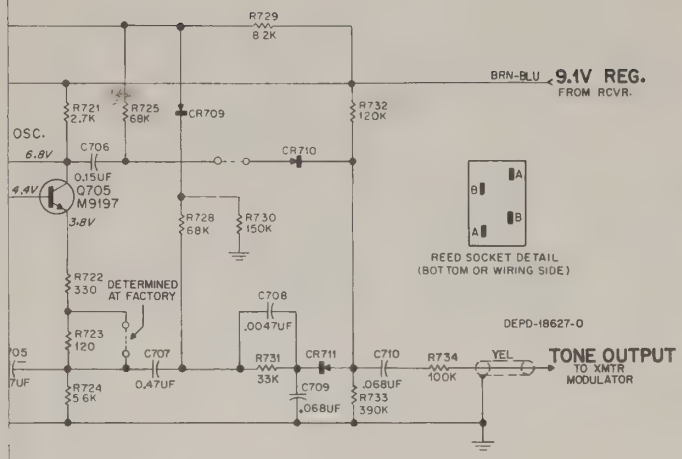
TLN8660A Power Supply Circuit Board EPD-18974-C

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: uf:
C210	23C82077C01	100 +150-10%; 35 v
C213, 215, 217, 218	21D82428B59	.01 +80-20%; 200 v
C214	21D82428B40	.01 +60-40%; 250 v
		SEMICONDUCTOR DEVICE, diode: (NOTE)
CR201 thru 208, 210, 212	48C82466H16	silicon
CR209, 211	48C82466H12	silicon
CR213	48D83461E11	silicon; zener type
CR214	48C82178A04	silicon
CR218	48C82392B03	silicon
		TRANSISTOR: (NOTE)
Q204	48R869271	N-P-N; type M9271
Q205	48R869299	N-P-N; type M9299
		RESISTOR, fixed: ±10%; 1/2 w unl stated
R201 thru 208	6S6475	680K
R216	6S118226	12; 1 w
R217	6S5701	820; 1 w
R218	6S6373	150
R219	6S5550	47
R220	6S6022	330
R221	6S6090	470
R222	6S6432	270
R226, 227, 229	6S6080	4.7K
R228	6S2009	22; 2 w
R230	6S5556	10K ±5%
R231	18C83168C01	500 ±20%; 2 w
R232	6S5551	120
R233	6S6477	15K
R235	6S6320	10K

NOTE:

Replacement diodes and transistors must be ordered by Motorola part number only for optimum performance.

Power Supply Circuit Board Detail
Motorola No. PEPD-18933-C1
10/1/68-RS



RELAY-

GND

A+

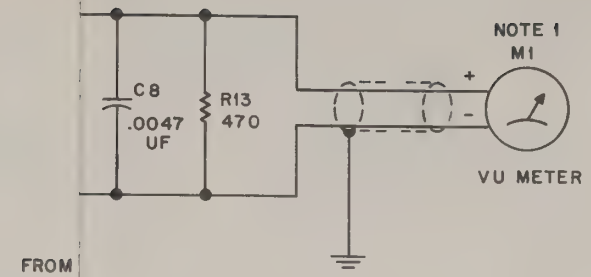
P-T-T FROM TB1-3

RELAY KEY

REFER TO OVERALL SCHEMATIC DIAGRAM FOR NOTE REFERENCES

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

"Private-Line" Tone Generator
Circuit Board Detail
Motorola No. PEPD-18621-O1
10/1/68-RS

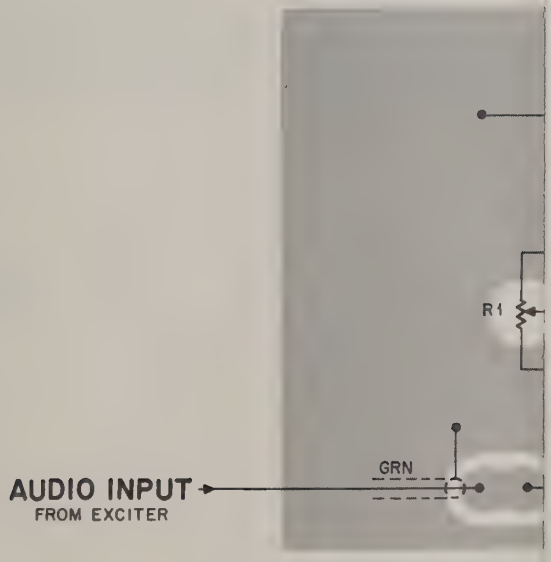


FROM
A

NOTE:

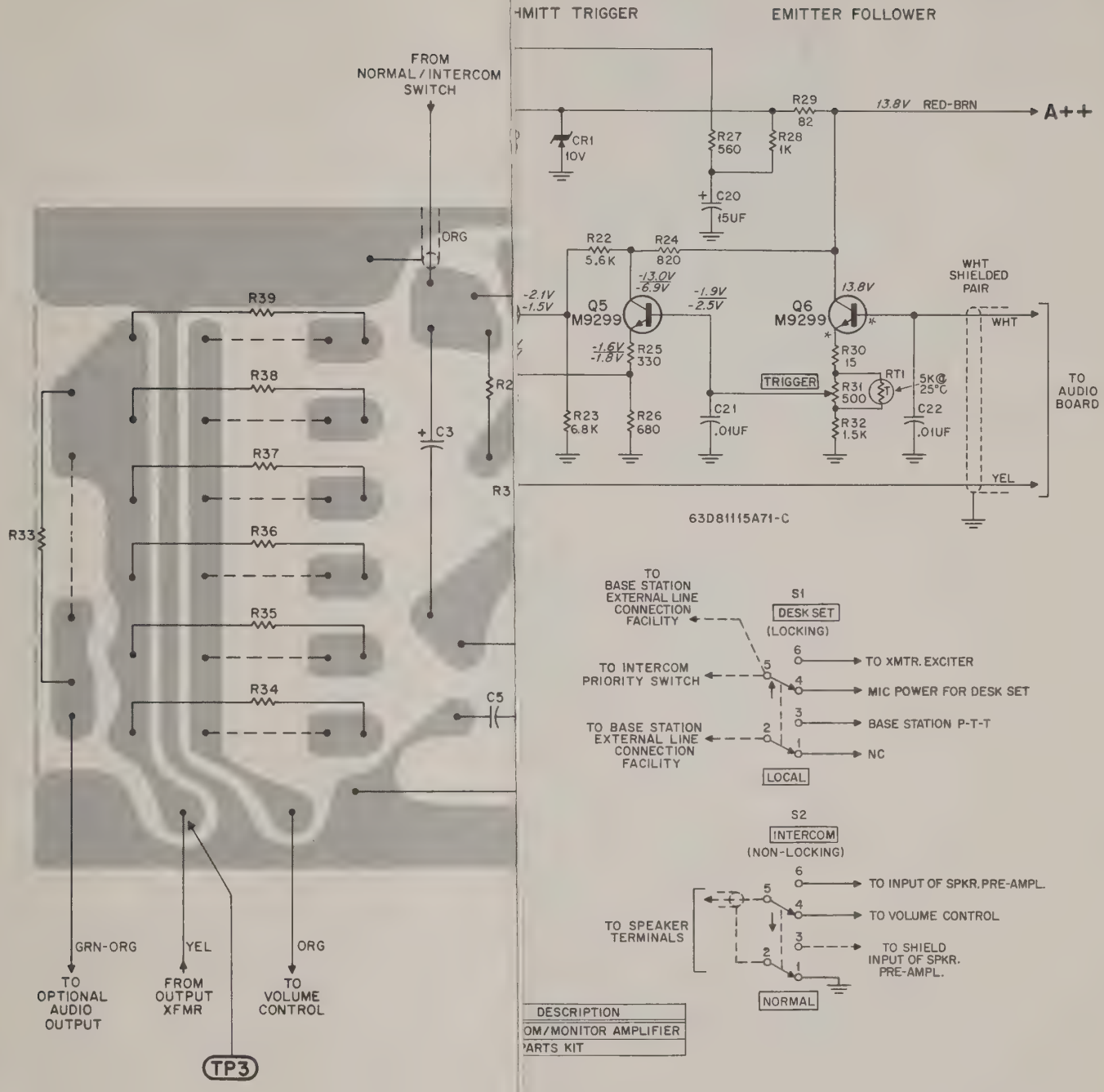
1. VU METER ON FRONT PANEL.

8839-A



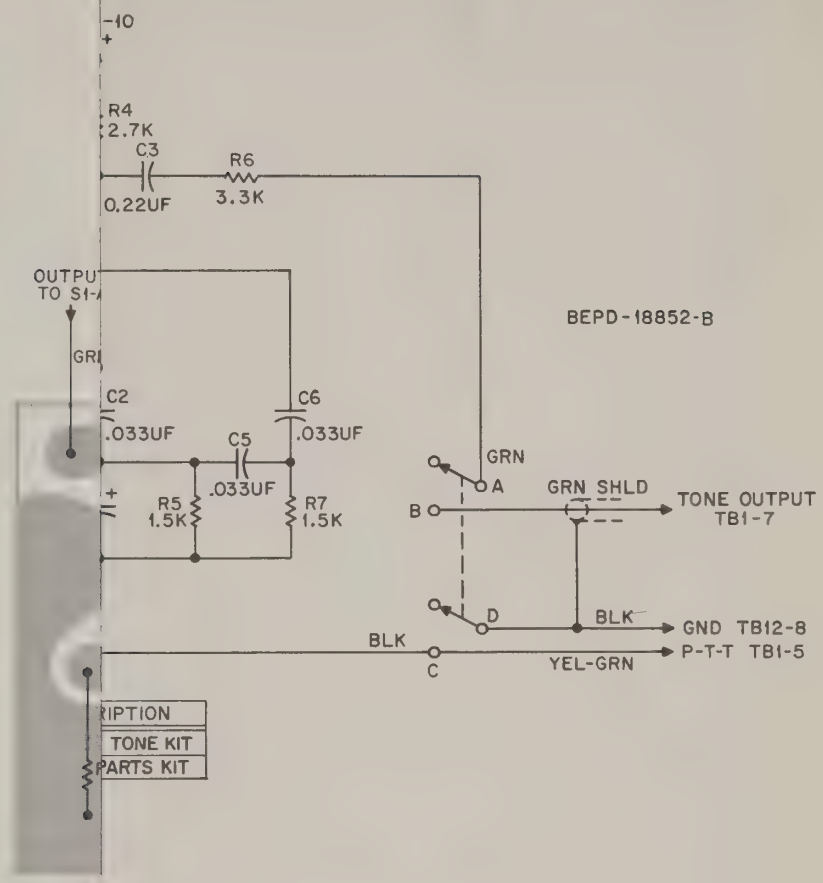
PREVIOUS REVISIONS AND PARTS LIST
SHOWN ON BACK OF THIS DIAGRAM

Model TLN1219A/TLN8624A VU Meter
Circuit Board Detail
Motorola No. PEPD-18838-B1
10/1/68-RS



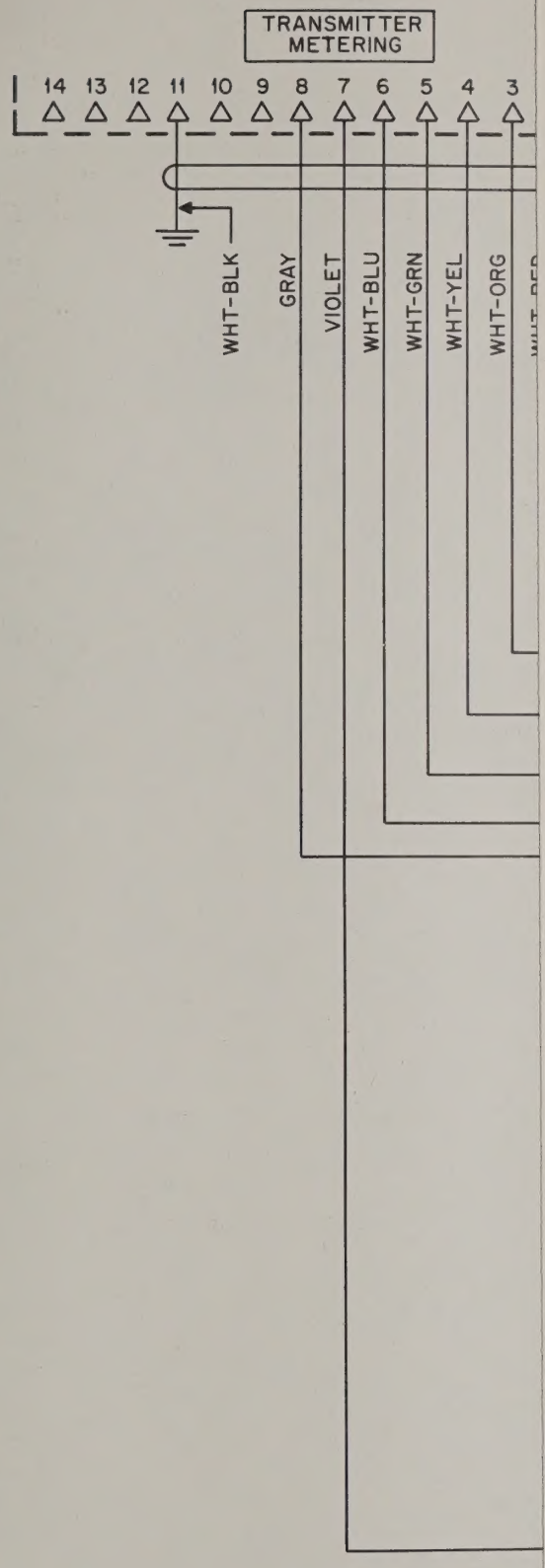
PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

Intercom Amplifier Schematic Diagram
And Circuit Board Detail
Motorola No. PEPD-18857-D1
10/1/68-RS



PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM

TLN1216A/TLN8664A Alert Tone Kit
Schematic and Circuit Board Detail
Motorola No. PEPD-18856-B1
10/1/68-RS



PARTS LIST

TLN8623A DC Metering Kit EPD-19255-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		AMMETER, DC:
M1	72C83319G01	0-50 microamperes; internal res 2560 ohms ±10%
		CONNECTOR, plug:
P1, 2	28B864669	male; 12 cont; does not incl 15A82798H01 SHELL
		RESISTOR, fixed: 1/2 w
R1	6K855337	17.5K ±2%
R2	6K811974	980K ±2%
R3	6D82475B64	19 meg ±1%
		SWITCH, rotary:
S1	40C83106B01	2 section; each section single pole; 18 position; non-shorting
		CABLE ASSEMBLY, special purpose:
W1-2	1V80775A50	c/o misc. leads, laced

DC Metering Kit
Schematic Diagram
Motorola No. 63C81053A84-O1
10/1/68-RS